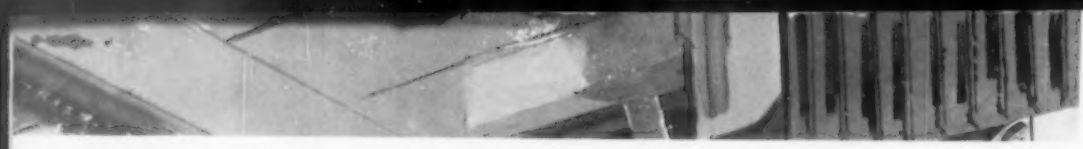


FOR
BETTER MANAGEMENT
OF
PLANT OPERATIONS

FACTORY

july 1960

PRICE ONE DOLLAR

A McGRAW-HILL PUBLICATION

EXCLUSIVE: MANAGEMENT AT THE SUMMIT
p. 67

THE TRUTH ABOUT ITV
p. 78

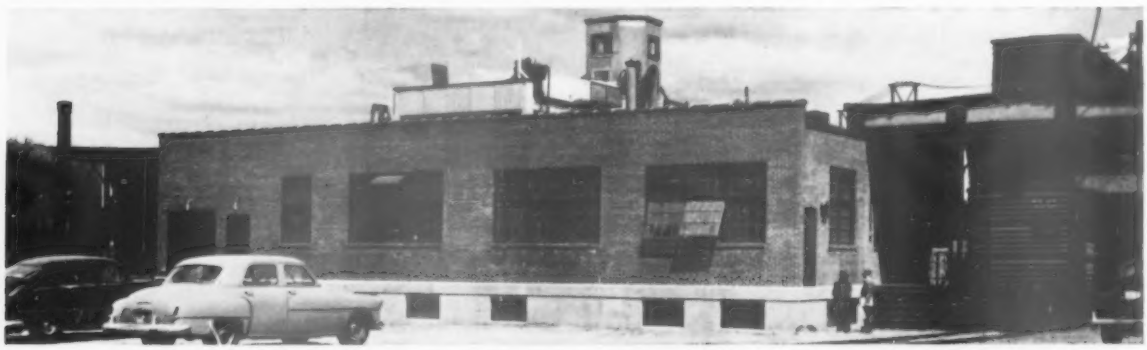
A MANUAL FOR MAINTENANCE
p. 206

COVER STORY
NEW LIFE FOR GAY '90s PLANT
p. 102

Gone to blazes $1,500,000!

This unsprinklered building, used for the manufacture of cardboard boxes, was completely destroyed by fire. Starting as a small flame in a pile of baled paper scrap, the fire was raging out of control when firemen arrived.

Proof that Grinnell sprinklers can save you from heavy loss by fire

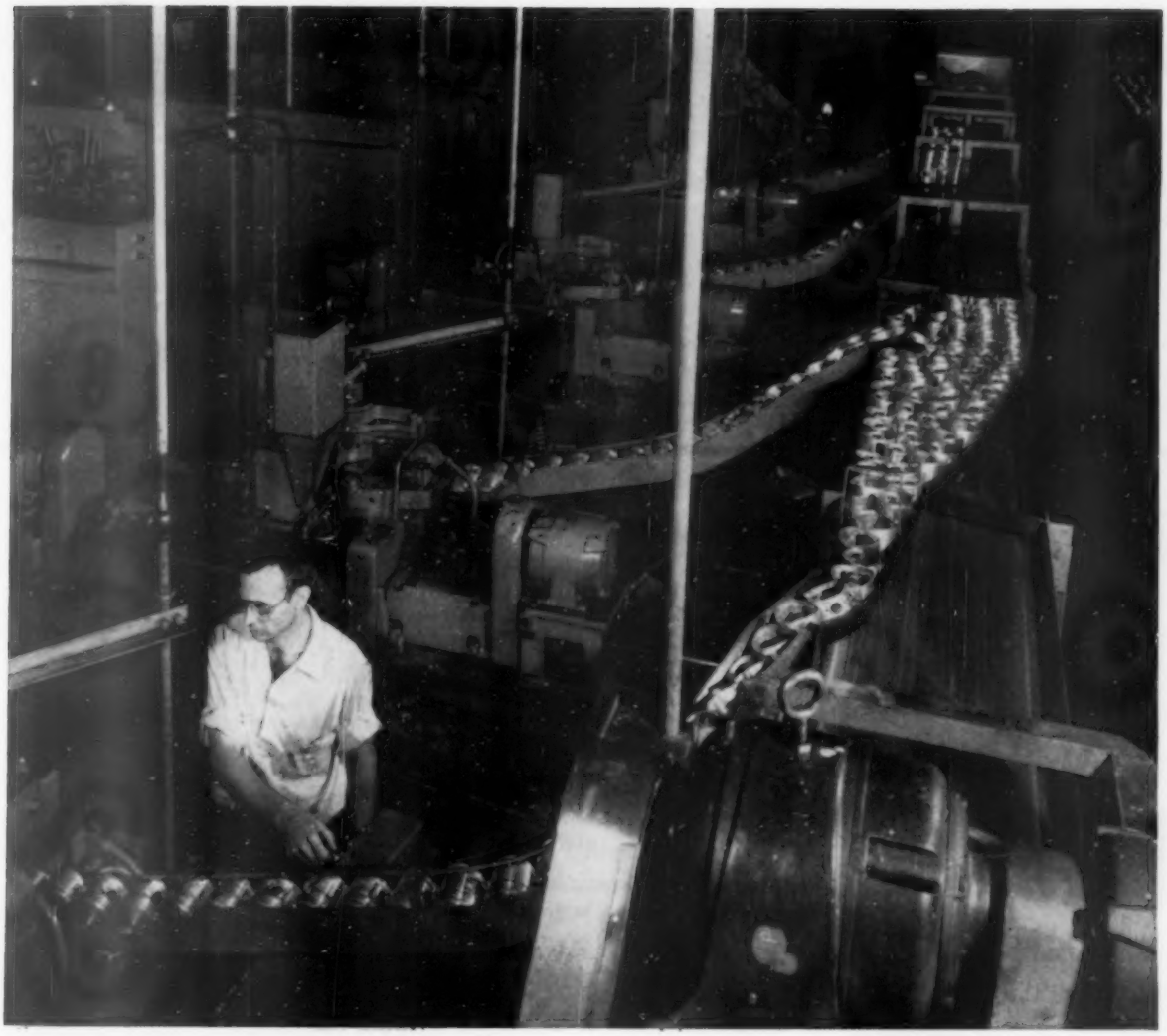


Two Grinnell Automatic Sprinklers quickly extinguished flames without damage to the building when fire struck this papermaker, Brown Company, Berlin, N. H. Grinnell sprinklers like these can easily be installed for you with a minimum of inconvenience. The complete system is normally fabricated in Grinnell shops, then shipped to location. Expert crews provide careful installation. Due to insurance savings, a Grinnell system often pays for itself in a very few years, as well. Get the complete facts. Grinnell Company, Providence 1, Rhode Island.

GRINNELL

AUTOMATIC SPRINKLER FIRE PROTECTION SINCE 1878

For more facts circle 382 on READER SERVICE CARD



Piston-packing belt helps build new cars

THE combination of sharp edges and oil on those pistons was ruining conveyor belts in four months. They cut grooves in the belt, ripped it, tore off the fasteners which held the belt together. The oil soaked into the belt cover, softened it, formed a dirty scum on the surface. Belts had to be cleaned and repaired constantly.

When a B.F.Goodrich distributor heard of the problem, he recommended a new B.F.Goodrich conveyor belt made of Koroseal flexible material. Koroseal resists scuffing, tearing, cutting; it stands oil, grease, most acids and just about everything else that ruins other materials. It can be vulcanized into a continuous belt, eliminating troublesome fasteners.

After a year's service, the Koroseal belt was still going strong—had lasted three times longer than the belt it replaced—carried over 2 million pistons. Even though this is a premium-priced belt, its cost when measured in terms of useful service is 48% lower than the belting it replaced.

Because the belt has a smooth, nonporous surface that's easy to clean, "locating holes" in the pistons don't get plugged up with dirt.

Your B.F.Goodrich distributor has the exact specifications for the Koroseal belt described here. And, as a factory-trained specialist in rubber products, he can answer your questions about the many products B.F.Goodrich makes for industry. *B.F.Goodrich Industrial Products Company, Department M-861, Akron 18, Ohio.*

Koroseal—T.M. Reg. U.S. Pat. Off.

B.F.Goodrich

CONVEYOR BELTS

FOR BETTER
• PLANT MAINTENANCE & ENGINEERING
• PRODUCTION
• PLANT MANAGEMENT

JULY 1960

FACTORY

PUBLISHER
Donald H. White

EDITOR-IN-CHIEF
Lester R. Bittel

MANAGING EDITORS
Robert S. Rice
George A. Hoy, Associate

SENIOR EDITOR
Carl G. Wyder—Plant Maintenance and Engineering

ASSOCIATE EDITORS
Oswald Stewart—Buildings
Gerald C. Quinn—Electrical
Willis A. Bussard—Production
Mervin F. Roberts
Roger W. Christian
Lawrence F. Mihlon

COPY EDITOR
Joan C. Hopkins

FEATURES

EXCLUSIVE REPORT—The Summit that never was 67
Behind the scenes at the labor-management peace talks.

Assembly-line speed for job-shop giants 70
Manufacturing concept that makes a new plant pay off.

Critical path scheduling 74
"Greatest advance since the Pharaohs" helps plan jobs better.

The truth about industrial TV 78
Its success will inspire you, its pitfalls will surprise you.

New language created for pallet-rack users 84
Manufacturers chase confusion to help plant men.

Retrain—to retain displaced employees 86
How one company faces the monster called automation.

Profit control for plant inventory 90
The department store manager has a good deal for you.

Indirect wages rise in nine more cities 93
Coast-to-coast report from the Bureau of Labor Statistics.

Imagination—the missing link in plant design 94
Editorial commentary by Buildings Editor Oz Stewart.

Production painting—E & T Report No. 6 95
Another *complete* chapter in your engineering handbook.

COVER STORY—Solid '60 life for a gay '90s plant 102
Sharp management works six-figure miracles in Chicago.

A book that drives home the maintenance message 206
Ten years in the making, it could be *your* big help too.

CASEBOOK p. 155

Milling machines actually clean up after themselves with the help of a suction device at Convair Division (page 156) . . . **Foreign assembly** plants are far from asleep in developing cost-saving ideas (page 161) . . . **In-plant feeding** is 65 years old at Norton; read how more complicated problems there demanded—and got—a more sophisticated cafeteria system (page 162) . . . **An old shoelace machine** was converted for use in braiding cable at General Radio. Result: much faster operations (page 169)

ASSISTANT EDITORS
Norman H. Solon—Case Book
Richard L. Grant—Features
Vivian E. Lunardi—Departments
Gladys Owen—Departments

ART DEPARTMENT
Carl Cerminaro, Director
Eleanore Luke

READER SERVICE
Regina La Rocco

CONSULTING EDITORS
L. C. Morrow
Lewis K. Urquhart

WORLD NEWS BUREAUS
John Wilhelm, Director
Margaret Ralston, Assistant Manager

DOMESTIC NEWS BUREAUS
Washington:
George B. Bryant, Director
Alan E. Adams, Labor Trends
Atlanta: B. E. Barnes
Chicago: Stewart W. Ramsey
Cleveland: Arthur Zimmerman
Detroit: Donald MacDonald
Dallas: Marvin Reid
San Francisco: Jenness Keene
Los Angeles: Kemp Anderson
Seattle: Ray Bloomberg

FOREIGN NEWS BUREAUS
London, Paris, Bonn, Moscow
Mexico City, Tokyo, Beirut, Caracas

McGRAW-HILL DEPARTMENT OF ECONOMICS
Dexter M. Keezer, Director
William J. Brown, Cost Index
Alfred Litwak, Business Trends

ADVERTISING AND BUSINESS DEPARTMENT
H. R. Mathias, Advertising Sales Manager
Charles E. Walsh, Promotion & Research Manager
William J. Thierer, Business Manager

CIRCULATION DEPARTMENT
Bain Brown, Manager

DISTRICT MANAGERS
L. E. Crist, Boston
J. G. Sabella, D. B. Waite, 500 5th Ave., N. Y. 36
L. L. Graves, Philadelphia
R. A. Dilley, Pittsburgh
W. H. Ware, Cleveland
T. W. Van Winkle, Detroit
B. M. Kewin, A. B. Martin, R. P. Rose, Chicago
B. M. Kewin, St. Louis
R. L. Yocom, Los Angeles
J. H. Hernan, San Francisco
M. H. Miller, Atlanta
John Grant, Dallas
Gene Holland, Houston
J. W. Patten, Denver
E. E. Schirmer, Malcolm Thiele, London; M. R. Zeynel, Geneva; Stanley Kimes, Frankfurt

NEWS

PRESS TIME REPORT: Looking Ahead in Business, Problem Solving Guide, Cost Index of Plant Maintenance, and Looking Ahead in Labor ..... *after* **60**

EDITORIAL: Needed: Management statesmanship—comment on the Summit **68**

EQUIPMENT NEWS: Fiber strapping—long on advantages, short on cost ***108***

LABOR RELATIONS NEWS: Lockout law, secondary boycott examined ***182***

CATALOG NEWS: Turn here for facts on fans, welders and much more ***218***

MATERIALS NEWS: Never-move magnetic alloy, two-faced self-adhesive ***236***

DEPARTMENTS

LETTERS: From our readers—more on maintenance training and its future **6**

IDEAS OF THE MONTH: To the rescue—oral resuscitator, oxygen tank ***176***

HUMAN RELATIONS: Pity the poor brass—their jobs are hard to come by ***198***

BOOKS: Critical comment on management's role *outside* the plant ***244***

FILMS: Worth seeing are offerings on fork trucks and a training program ***248***

ADVERTISERS' LITERATURE: Solid sales information for your files ***254***

COMING

In August we'll present a provocative and vital special package—clerks, cards, and computers—your plant guide to data processing. In it you'll read about the costs, confusion, and control of data-handling equipment that could work wonders in your plant. We believe it to be the most complete comment on the "state of the art" that has yet been published in a management magazine. It's one *you'll* want to save.

THE COVER

Surrounded by the moving colors of a coin machine assembly conveyor at Seeburg are managers Healey, Gregory, Carlman, Kehoe, Isacksen, Johnson (left to right). Read their story on page 102.

Painting by Frank Lacano

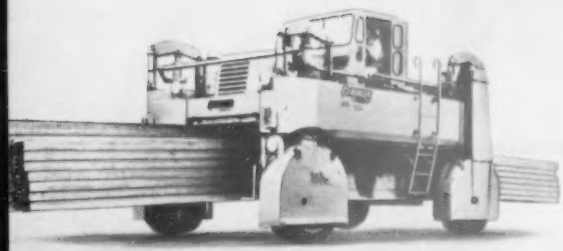
69TH YEAR OF PUBLICATION

JULY 1960 Vol. 118 No. 7

Published monthly by McGraw-Hill Publishing Company, Inc., 330 West 42nd St., New York 36, N. Y. Publication office: 99 N. Broadway, Albany 1, N. Y. Second-class postage paid at Albany, N. Y. Subscription in U.S.A.: $2 a year. For further details, see page 10.

TOWMOTOR-GERLINGER

offers you three complete capital-saving services!



1 YOU LEASE *without down payment!*

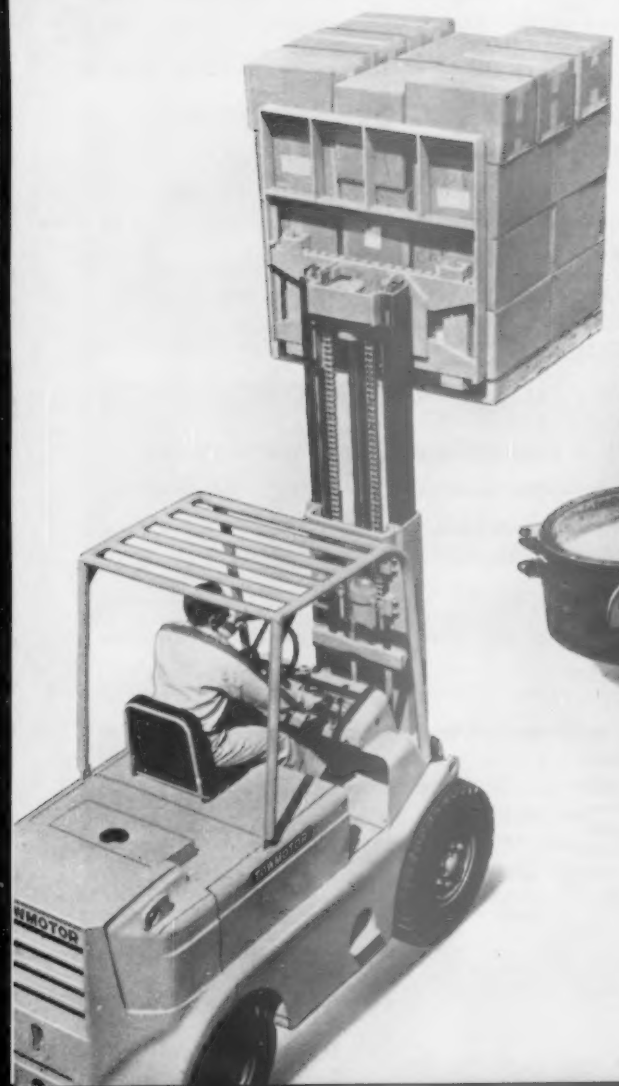
You don't make a *down payment* when you use the Towmotor-Gerlinger Lease-A-Truck Plan. You put T-G equipment to work on a continuous, year-'round basis. You just make a small monthly payment—paid out of savings the equipment produces.

2 YOU RENT *without cash outlay!*

You don't tie up working capital when you *rent* Towmotor-Gerlinger fork lift trucks and material carriers. You put them to work immediately. You start cutting handling costs immediately. Your only cash outlay is one small monthly charge.

3 YOU BUY *and save as you pay!*

You don't pay cash for Towmotor-Gerlinger equipment when you use our low-cost Time Payment Plan. You make reasonable monthly payments. Low interest rates make it easy. Handling economies consistently pay the monthly cost many times over.



Complete factory-supervised maintenance can be included in *any* of the above plans! For complete information, write Towmotor-Gerlinger Rental Division, Towmotor Corporation, Cleveland 10, Ohio.

TOWMOTOR-GERLINGER

THE ONE-MAN-GANG®

FORK LIFT TRUCKS, CARRIERS AND TRACTORS SINCE 1919

Gerlinger Carrier Co. is a subsidiary of Towmotor Corporation

9 trouble-free years— still no trouble in sight

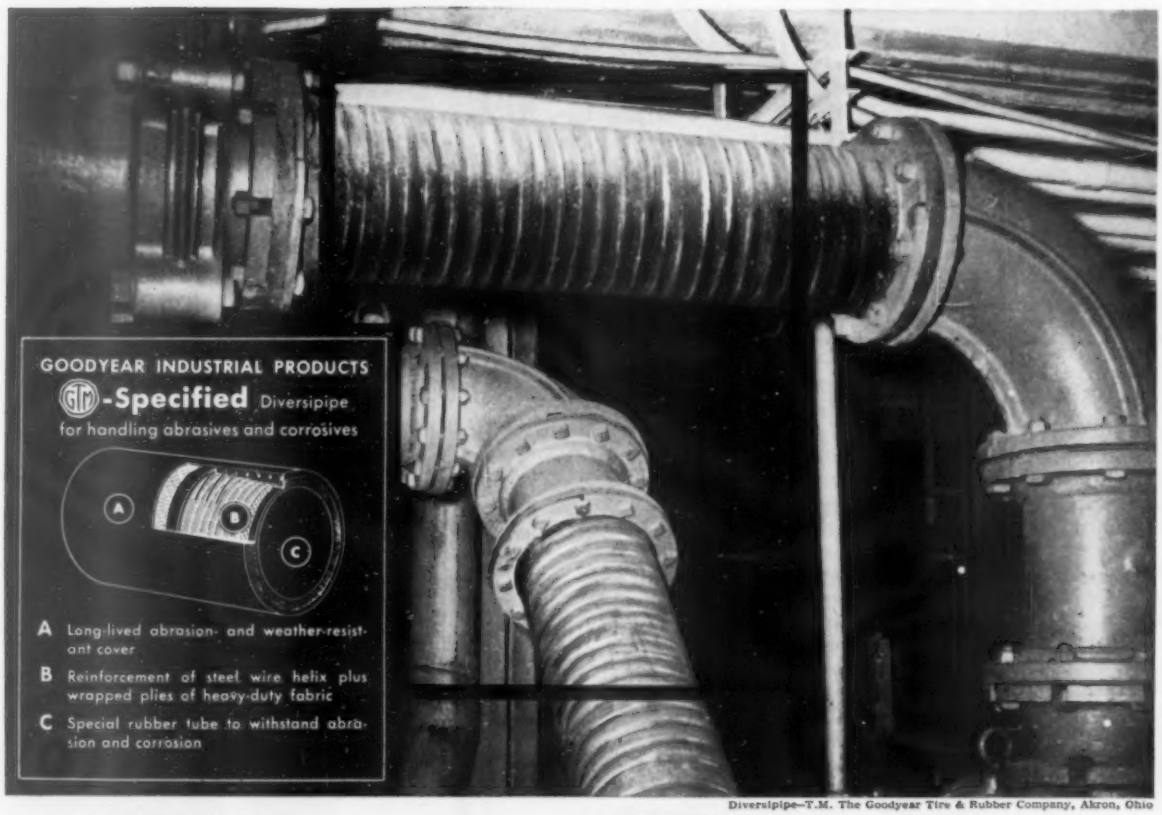
HANDLING the murderous abrasion of iron-ore slurry was only part of the problem when they added new facilities at this big Northeastern mine. There was also incessant vibration from pumps and refiners—certain to encourage leakage and shorten the life of just about any kind of slurry lines used.

But not if the lines were Diversipipe: recommended by the G.T.M.—Goodyear Technical Man. That super-tough rubber pipe fights off abrasion—absorbs shock. A bonus benefit: its flexibility makes intricate installations easier and less expensive.

At last report, the Diversipipe had been handling minus 14 mesh slurry—at 10 feet per second—for 9 straight, trouble-free years. And it's still giving like-new performance.

In fact, Diversipipe has proved the moneysaving answer to tough material-handling problems like this in many a plant. For expert tips on handling pumpable materials—especially abrasives or corrosives—check with the G.T.M. through your Goodyear Distributor. Or write Goodyear, Industrial Products Division, Akron 16, Ohio.

IT'S SMART TO DO BUSINESS *with your Goodyear Distributor. He can give you fast, dependable service on Hose, V-Belts, Flat Belts and many other industrial rubber and nonrubber supplies. Look for him in the Yellow Pages under "Rubber Goods" or "Rubber Products."*


GOODYEAR INDUSTRIAL PRODUCTS
GR-Specified Diversipipe
for handling abrasives and corrosives
A
B
C
A Long-lived abrasion- and weather-resistant cover
B Reinforcement of steel wire helix plus wrapped plies of heavy-duty fabric
C Special rubber tube to withstand abrasion and corrosion

Diversipipe—T.M. The Goodyear Tire & Rubber Company, Akron, Ohio

DIVERSIPIPE BY

GOODYEAR

THE GREATEST NAME IN RUBBER

For more facts Circle 385 on Reader Service Card

For more facts Circle 386 on Reader Service Card

SPAN A TRACK
to speed plant traffic

LOWER A TRUCK
for faster loading and unloading

FEED A MACHINE
with greater economy and efficiency

LEVELATOR LIFTS
handle heavy loads at lower cost

Operating on economical oil-hydraulic power, Rotary Levelator Lifts can be used wherever heavy objects must be raised or lowered. Standard models with 6,000 and 12,000-lb. capacities are designed for a wide variety of uses and are stocked for immediate delivery. Special Levelator Lifts in any capacity to several hundred thousand pounds can be engineered to your requirements. Simplicity of design and operating mechanism makes installation easy and practically eliminates any maintenance expense.

Write for Catalog RE-203

Rotary® **LEVELATOR LIFTS**

Manufactured by
ROTARY LIFT COMPANY
Division of Dover Corporation
1153 Kentucky, Memphis 2, Tenn.
Canadian plant at Chatham, Ontario

FACTORY LETTERS

Managed Maintenance Makes Sense

Dear Sir:

I have just read L. C. (Jack) Morrow's "Managed Maintenance" in FACTORY's January issue (page 65). Congratulations to you on this very fine article. It brings together in one place the many things we have discussed over a long period of time.

For many years we have been following your example of trying to elevate the maintenance manager—and maintenance—to its rightful position in industry.

The things we are preaching are fundamental and we must continue to preach them, even though at times we think that the rate of progress would indicate we are "a voice in the wilderness."

R. L. Kirkpatrick

Westinghouse Electric Corp.
East Pittsburgh, Pa.

Dear Sir:

The best story on maintenance I could mention can be found on page 65 of FACTORY for January. You (Consulting Editor L. C. Morrow) have done a fine job and I chime in with friends and admirers in wishing you many more years of useful activity.

C. P. Wood

Lockwood Greene Engineers, Inc.
41 E. 42nd St., New York 17.

More on Maintenance Training

Dear Sir:

Congratulations to George A. Hoy for the excellent article on "Maintenance Training" in FACTORY's February issue (page 89).

I found the article informative, objective, thought-provoking and very well written.

Herb Mack

Supervisor, Industrial Relations
Lockheed Aircraft Service, Inc., Honolulu

Dear Sir:

Your article on "Maintenance Training" in February FACTORY is tops. How do I get reprints?

M. L. Mullins

Supervisor of Personnel Development
Standard Oil Co., Chicago.

Dear Sir:

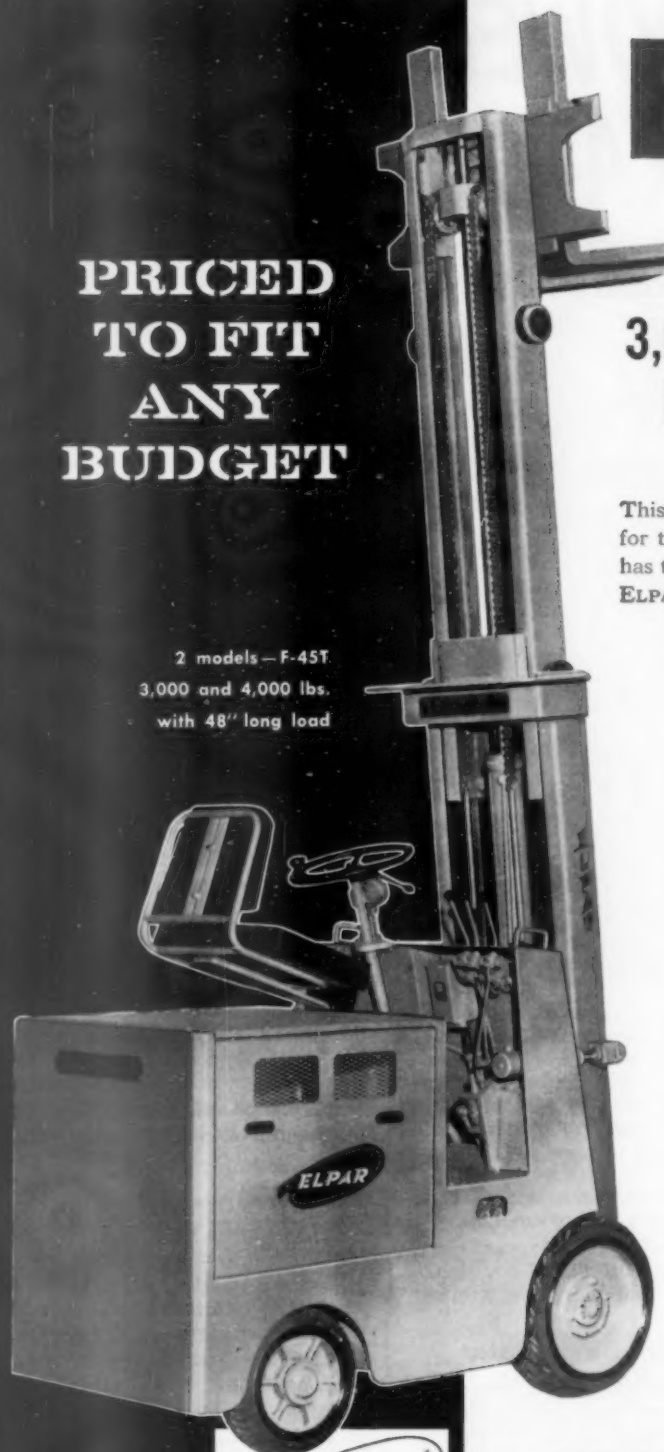
"More and Better Maintenance Training" in your February issue was extremely well written and controversial enough to really give readers something to think about. We have already had several inquiries about our program as a result of your article. We're always glad to help anyone that we can. There is so

ELPAR "F-45T"

3,000 & 4,000 lb. Cap. Electric Fork Truck

PRICED TO FIT ANY BUDGET

2 models—F-45T 3,000 and 4,000 lbs. with 48" long load



This ELPAR fork truck is the new pace setter for the industry. It's priced competitively yet has the traditional quality that is typical of all ELPAR electric trucks. Check these advantages:

FAST—Travel speeds up to 7 MPH and lift speeds to 40 FPM.

COMPACT—Only 35" wide with an 84½" stacking aisle (less forks).

DEPENDABLE—Heavy duty construction, oversize tires, low pressure hydraulics, rugged drive axle, center-sill frame.

SAFE—Wide stance trail axle—26¾" tread, hydraulic wheel brakes, inching control, improved operator vision.

ECONOMICAL—Operates on pennies per day electric power and is designed for fast, easy maintenance.

This truck has been job tested in service on all kinds of jobs and has proved its economy and dependability.

Available for Fast Delivery

WRITE TODAY!
Get full details on ELPAR'S "F-45T"

ELPAR
ELECTRIC TRUCKS

THE **ELWELL-PARKER** ELECTRIC CO.
4020 St. Clair Avenue • Cleveland 3, Ohio
In Canada: Industrial Equipment Company, Ltd.

Double the life—One-third the operating cost.

New! Kinnear POWER OPERATOR

FINEST ROLLING DOOR OPERATOR EVER DESIGNED

Adds more efficiency than ever to KINNEAR ROLLING DOORS

FEATURES:

New "Removable" Design — doesn't disturb auxiliary hand-chain operator.

Any Mounting! Vertical or horizontal — on door or wall bracket, or through-the-wall!

Easy Installation. Simple in-the-field control-wiring to a terminal strip.

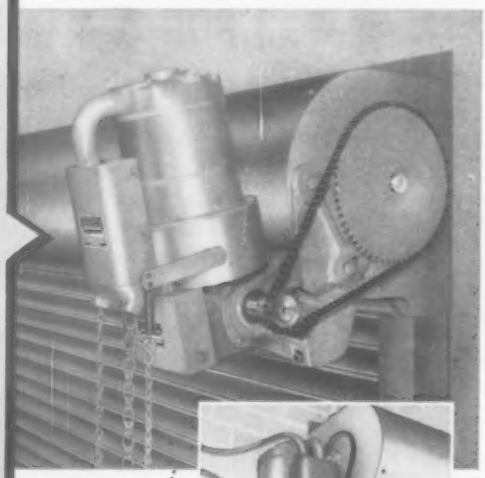
Reserve Power for smooth action regardless of wind pressure, drifted snow, collected grime, or extra years of usage.

Thermal Protection Against Overload — motor cuts out before damage can occur.

New Worm Gearing for highest efficiency and longest service.

Centrifugal Clutch transmits motor action to door with no shock. Prevents motor stalls and overload damage.

Seven Sizes! Capacities for doors of any size!



MOUNTS ON DOOR!

OR ON WALL....

(OR THROUGH THE WALL)

A new high in door efficiency is reached in Kinnear Rolling Doors equipped with the new Kinnear "Series Three" Power Operator. This is an *all-new* concept in motorization for rolling doors — designed with a single goal in mind — to *reduce to minimum* all chance for troubles from overload, torque shock, constant start-stop action—in a motor that assures easiest installation and maintenance, and permits any type of mounting.

The "Series Three" Kinnear Power Operator, like the Kinnear Rolling Door itself, is the finest achievement today's engineering skills can produce.

Write for new Power Operator Bulletin

The KINNEAR Mfg. Co.

FACTORIES: 1540-60 Fields Avenue, Columbus, Ohio
1742 Yosemite Avenue, San Francisco 24, Calif.
Offices and Agents in All Principal Cities

KINNEAR ROLLING DOORS
Saving Ways in Doorways

much more that could be done on this matter than is being done.

Ralph G. Smith
Asst. Dir., Labor Relations
The Dow Chemical Co.
Midland, Mich.

Standard Cost Primers

Dear Sir:

We anticipate installing a standard cost system.

Could you inform us as to where we could get information and ideas concerning standard costs?

T. E. Vogel
Accountant, Burns Mfg. Co.
Aitkin, Minn.

► Your best source of information for this is the library of the National Association of Accountants, 505 Park Ave., New York City. They tell me they will be glad to send you any information, reprints, or books they may have on this subject if you are a member of the Association.

I might also suggest two books published by McGraw-Hill Book Co. (330 West 42nd St., New York 36): "Standard Handbook for Accountants," by J. K. Lasser; and "Standard Costs for Manufacturing," by Stanley B. Heurici. These should be helpful.—ED.

Perseverance Pays

Dear Sir:

I kept the article, "Tighter Control of Downtime," which appeared in FACTORY's July 1954 issue, against the time that the idea might be applicable to

FACTORY welcomes opinions and suggestions from its readers. They help us put management problems in better perspective. Letters should be addressed: The Editor, FACTORY, 330 West 42nd St., New York 36.

From coast to coast, thousands of industrial, commercial and institutional establishments have discovered the *economy* of using ADT *automatic* protection to safeguard life, property, and profits against fire, burglary, holdup, sabotage and other hazards.

The leader in automatic property protection, ADT manufactures, installs, maintains and operates the most modern protection systems available anywhere. ADT electric and electronic systems are specifically designed to provide maximum security at lowest cost. Thousands of ADT subscribers enjoy substantial savings over other, less dependable and far more expensive methods of guarding their properties. At the same time, they are assured of the most reliable protection available.

ADT central stations are located in principal cities. In other areas, ADT systems may be connected directly to police and fire departments. These systems are fully maintained and regularly tested by ADT specialists.

For additional information, call our sales office in your city, listed in the Yellow Pages under *Burglar Alarms* or *Fire Alarms*, or write to our Executive Office.

ADT

Controlled Companies of

AMERICAN DISTRICT TELEGRAPH COMPANY

Executive Office: 155 Sixth Avenue, New York 13, N. Y.

A NATIONWIDE ORGANIZATION

For more facts Circle 390 on Reader Service Card

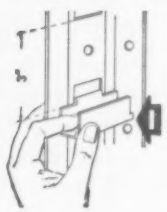
you can't expect a
200-pounder to win
a beauty contest

but you CAN expect the best
shelving value when you buy

BORROUGHS

STEEL SHELVING

When it comes to choosing the best shelving, you want FACTS — not fancy words. And when we say that Borroughs Steel Shelving is the most simple, most flexible, most rapidly assembled shelving in America—as tough and durable as money can buy — we have the facts to back it up! If you can arrange to see an actual Borroughs shelving installation "in action", you'll get first-hand proof of Borroughs' superiority. In any case, write for "fact-packed" literature today.



send for catalog

Represented in Sweet's Catalog,
Plant Engineering File 4G BO

Insert 4 shelf support brackets . . . no fumbling with studs, bolts, nuts or lock washers.

and then

Tilt shelf into support brackets . . . and shelf is ready for loading.

BORROUGHS MANUFACTURING COMPANY
OF KALAMAZOO
A SUBSIDIARY OF THE AMERICAN METAL PRODUCTS COMPANY OF DETROIT
3020 NORTH BURDICK ST. amp® KALAMAZOO, MICHIGAN

FACTORY / LETTERS

Begins on page 6

some operation over which I have supervision.

That time has come.

Can you send me the name of the company that manufactures the Alden Multi-Channel Recorder mentioned in the article? Also, the names of other manufacturers of devices that give data to control downtime, if you have such information in your records.

W. C. Zinck
Plant Manager
Arbogast & Bastian, Inc.
Allentown, Pa.

►We are pleased to hear that FACTORY articles are useful even five years after publication.

The Multi-Channel Recorder is made by Alden Products Co., 119 N. Main St., Brockton 64, Mass.

Other companies that make equipment designed to record machine operations are: Control Systems Co., Div. of Hancock Industries, Jackson, Mich.; Simplex Time Recorder Co., 50 S. Lincoln Ave., Gardner, Mass.; Standard Instrument Corp., Div. of Heat-Timer Corp., 657 Broadway, New York 12.—ED.

FACTORY

July 1960 Vol. 118, No. 7

A consolidation of Factory Management and Maintenance and Factory and Industrial Management, including Factory, and Maintenance Engineering. Published monthly by McGraw-Hill Publishing Co., Inc. James H. McGraw (1860-1948), Founder.

Executive, Editorial, Circulation, and Advertising Offices: McGraw-Hill Building, 330 W. 42nd St., New York 36, N. Y.

Officers of the Publications Division: Nelson L. Bond, President; Shelton Fisher, Wallace F. Traendly, Senior Vice Presidents; John R. Callaham, Vice President and Editorial Director; Joseph H. Allen, Vice President and Director of Advertising Sales; A. R. Venezian, Vice President and Circulation Coordinator. Officers of the Corporation: Donald C. McGraw, President; Joseph A. Gerardi, Hugh J. Kelly, Harry L. Waddell, Executive Vice Presidents; L. Keith Goodrich, Vice President and Treasurer; John J. Cooke, Secretary.

FACTORY solicits subscriptions only from production, maintenance, and management executives, and engineers in manufacturing plants. Please indicate company connection and title on all subscription orders.

United States subscription rate for individuals in the field of the publication, $2, 1 year; $3, 2 years; $4, 3 years. Canadian rate, $3 per year. Foreign rate, $25 per year. Single copies in U.S.A., $1.

Title registered in U.S. Patent Office. ©Copyright 1960 by McGraw-Hill Publishing Company, Inc. All rights reserved. Printed in U.S.A.

UNCONDITIONAL GUARANTEE: Our primary aim is to provide subscribers with a valuable publication. Your comments and suggestions for improvement are encouraged and will be most welcome. The publisher, upon written request from any subscriber to our New York office, agrees to refund the part of the subscription price applying to copies not yet mailed.

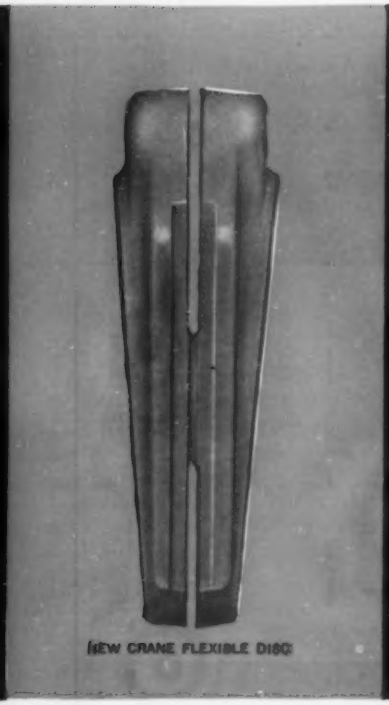
Subscriptions: Address subscription and change-of-address correspondence to Fulfillment Manager, FACTORY, 330 W. 42nd St., New York 36, N. Y. For change of address, state old and new address, including zone, and allow one month.

Postmaster: Send Form 3579 to FACTORY, 330 W. 42nd St., New York 36.

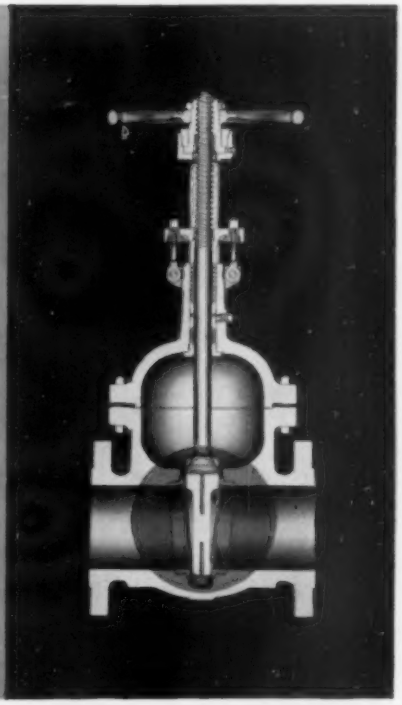
Reporting more news from...

CRANE DIRECTION '70

. . . a fast-moving program of planned expansion, product development, and streamlined distribution to help our customers meet the challenge of the Soaring Sixties.



NEW CRANE FLEXIBLE DISC



The most significant advance in gate valve design in 25 years...

CRANE FLEX GATES®

Instead of being made with a solid disc, new, patented Crane Flex Gates have separate disc faces, connected by the axle-like unit shown in the cross section. This joins the two seating faces, yet provides flexibility for the faces to seat tightly with independent action.

BECAUSE THEY'RE FLEXIBLE, new Crane Flex Gates seat with less torque.

BECAUSE THEY'RE FLEXIBLE, new Crane Flex Gates unseat with less torque . . . will not stick closed even when closed while hot and allowed to cool.

BECAUSE THEY'RE FLEXIBLE, minor deflection of seating faces due to pipe strains does not affect tightness of Crane Flex Gates.

BECAUSE THEY'RE FLEXIBLE, new Crane Flex Gates are tight on inlet seat and outlet seat over a wide range of pressures.

BECAUSE THEY'RE FLEXIBLE, new Crane Flex Gates can be used singly in some services where two conventional gate valves are frequently specified. You can save substantially on piping costs.

BECAUSE THEY'RE FLEXIBLE, new Crane Flex Gates can be serviced—body seat rings replaced or seating faces refinished—quickly, and without painstaking accuracy. Slightly off-taper seats do not affect tightness or operating ease.

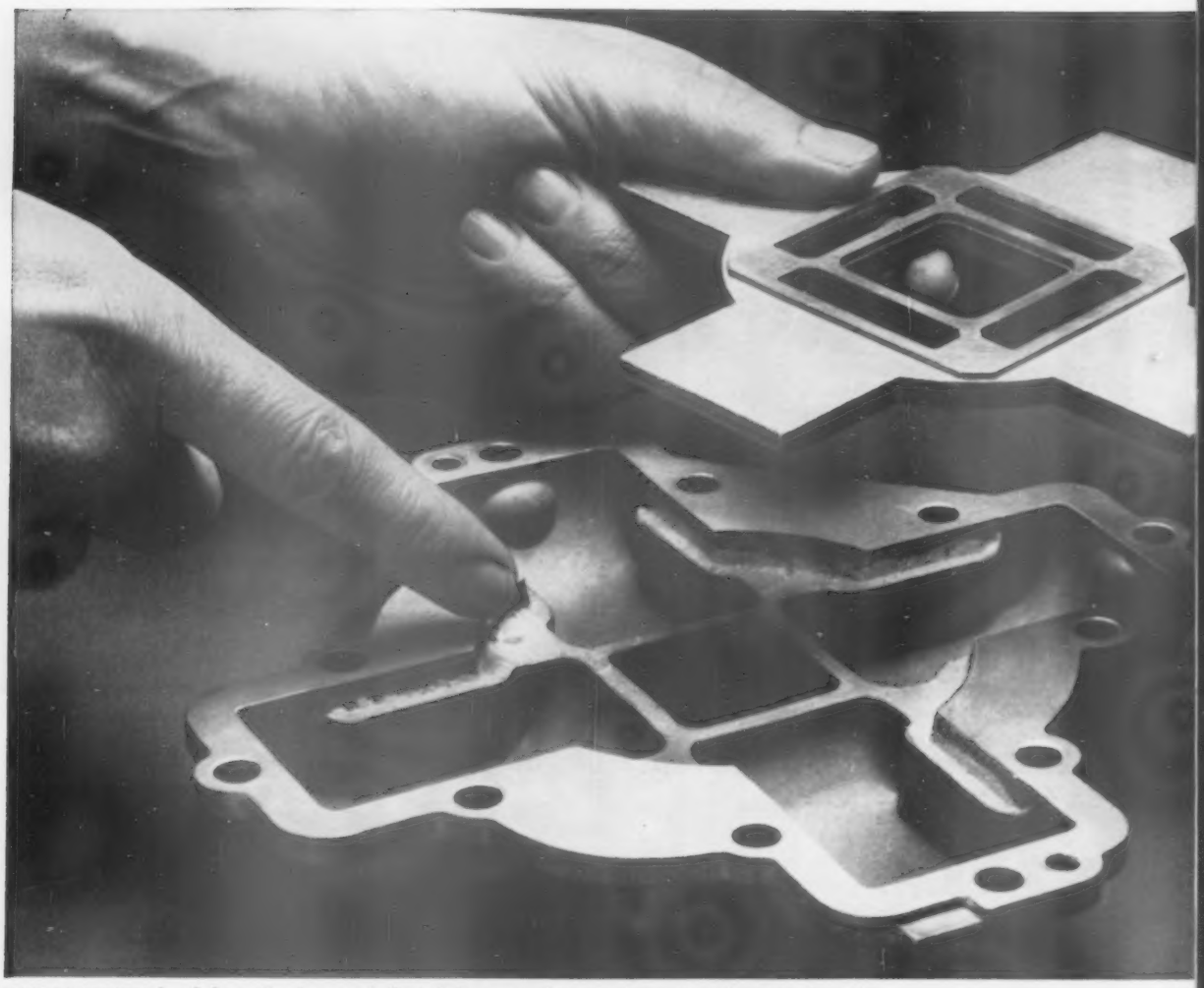
BECAUSE THEY'RE FLEXIBLE, new Crane Flex Gates will easily outperform any conventional solid wedge disc valve you now use. *And there's no increase in price.*

BECAUSE THEY'RE MADE BY CRANE, these new Flex Gates are completely dependable. You can use them with complete confidence on steam, water, gas, oil or oil vapor service. Stem and disc seating faces are Crane Exelloy. Shoulder-type body seat rings are Exelloy or Crane No. 49 Nickel Alloy. Sizes: 12 inch and smaller; 150- and 300-pound pressure classes.

Ask your Crane Distributor for full information on Flex Gates—and for data whenever you work with the products Crane makes. He has the newest in information and products. Crane Co., Industrial Products Group, 4100 South Kedzie Avenue, Chicago 32, Illinois.

CRANE®

VALVES • ELECTRONIC CONTROLS • PIPING • PLUMBING • HEATING • AIR CONDITIONING



SEPARATE CASTINGS, bonded together in areas indicated, form complete complex casting shown on the right.

Cut rejects! Fabricate complex castings with

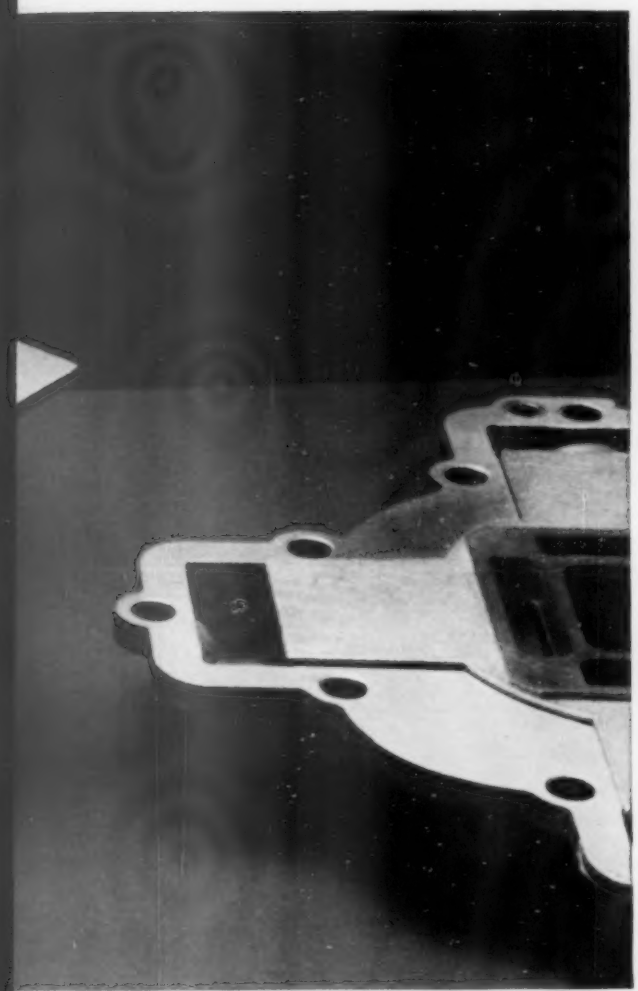
Now you can simplify production of hollow castings —and end costly rejects by casting them in sections, then bonding the sections together with high-strength SCOTCH-WELD Structural Adhesives, such as EC-1386!

By so doing, you eliminate the high rejection rate that often accompanies sand molding. You eliminate the costly machining and equipment required for mechanical fastening. You eliminate the wasteful, space-consuming bosses or flanges.

All you need is a flow gun and an oven. EC-1386 is a 100% non-volatile liquid and is solvent free. Thus, waste is negligible; no pre-drying is required before joining the sections. The adhesive bond can be cured to high ultimate strength quickly in an air-circulating oven (one to two minutes at 500°F. bond line temperature). And the cured bond can be machined for final touch-up operations. EC-1386 also serves to fill in voids, so that parts need not be held to close tolerances.

See how EC-1386 can help you cut costs, simplify and speed production and improve product quality. And learn how other 3M Adhesives are helping the metalworking industry. Contact your 3M Field Engineer. Or write: AC&S Division, 3M Company, Dept. SBFF-70, St. Paul 6, Minnesota.

"SCOTCH-WELD" and "CORO-GARD" are Reg. T.M.'s of 3M Co.

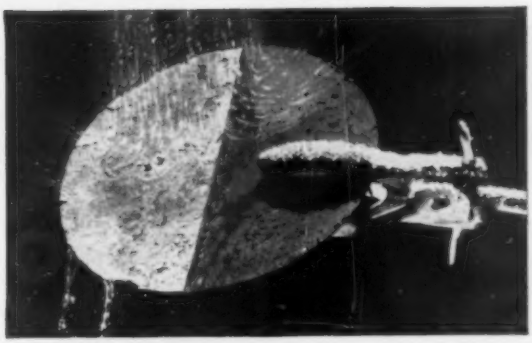


SCOTCH-WELD®

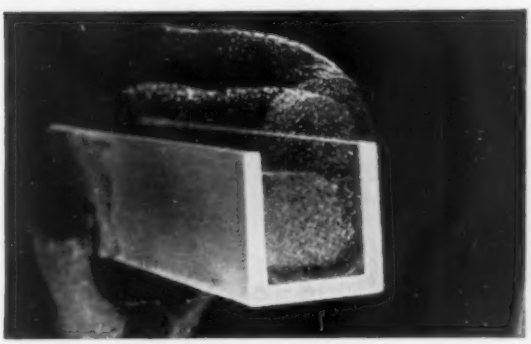
BRAND STRUCTURAL ADHESIVES

COLD SANDWICH BONDING. 3M Adhesive EC-1357 makes it possible for you to bond sandwich panels with a nip roller or cold press. You need no clamps or heated presses to complete tough core-to-skin bonds that resist moisture and high and low temperatures. This one adhesive bonds a variety of materials quickly, economically. Its dark color absorbs infrared heat quickly, dries fast.

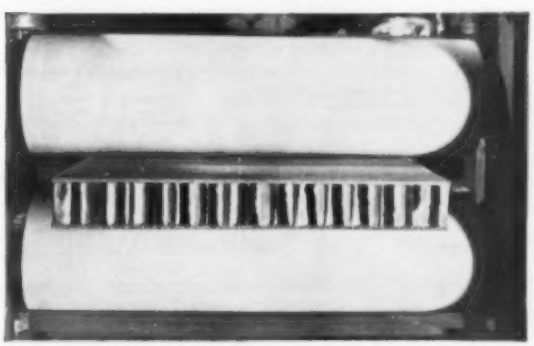
News about other 3M products



CORROSION RESISTANT COATING. CORO-GARD® 1706 Brand Protective Coating resists corrosive fluids and fumes, water and abrasion. It passed these torture tests: 2000-hour corrosive salt spray attack; 20-week submersion in 20% solution of hydrochloric acid; 6-month weather exposure in Miami, Florida. For steel, aluminum, wood, concrete, cloth, even some plastics.



SURE WAY TO SEAL. 3M Heat Expandable Sealers expand up to 125% under the normal heat of a paint-baking cycle, cure to a tough, flexible mass that keeps out dirt, water and weather, completely seal even the most irregular gap or seam. The unexpanded solid is also efficient as a gasket replacement sealer, flange sealer and for other sealing jobs.



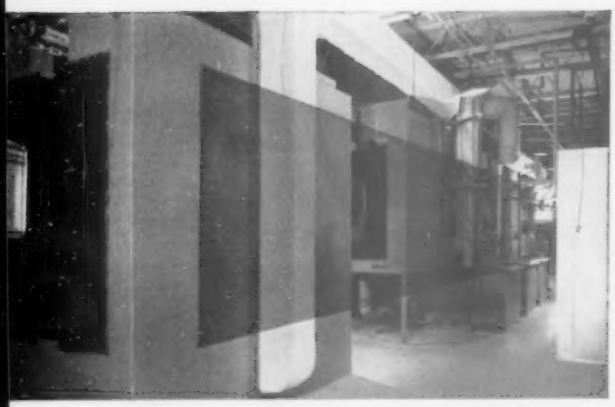
ADHESIVES, COATINGS AND SEALERS DIVISION

MINNESOTA MINING AND MANUFACTURING COMPANY

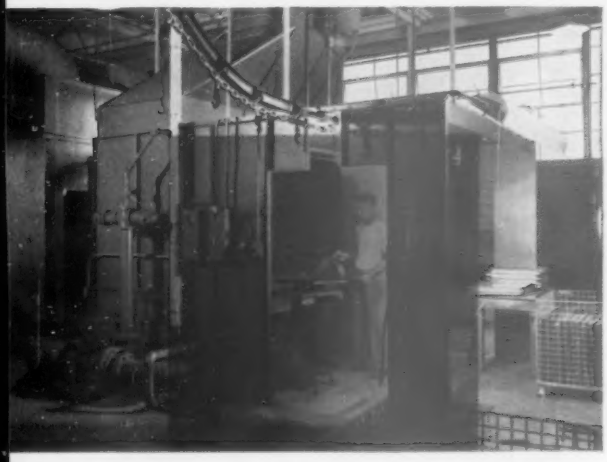
...WHERE RESEARCH IS THE KEY TO TOMORROW

3M COMPANY

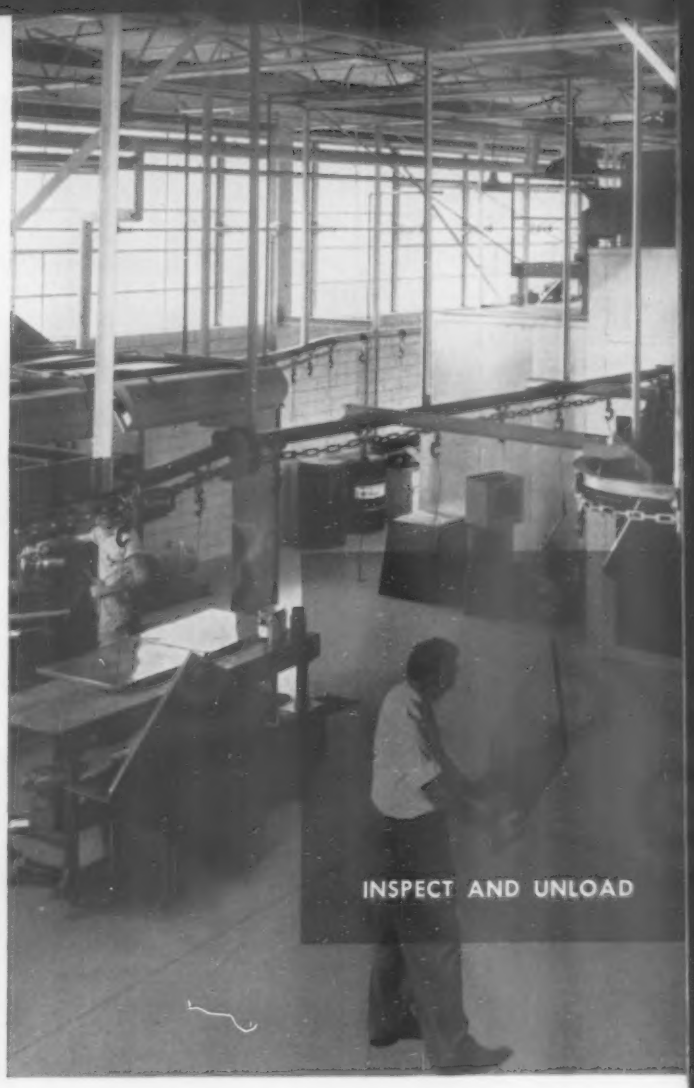
DeVilbiss Complete Finishing Systems



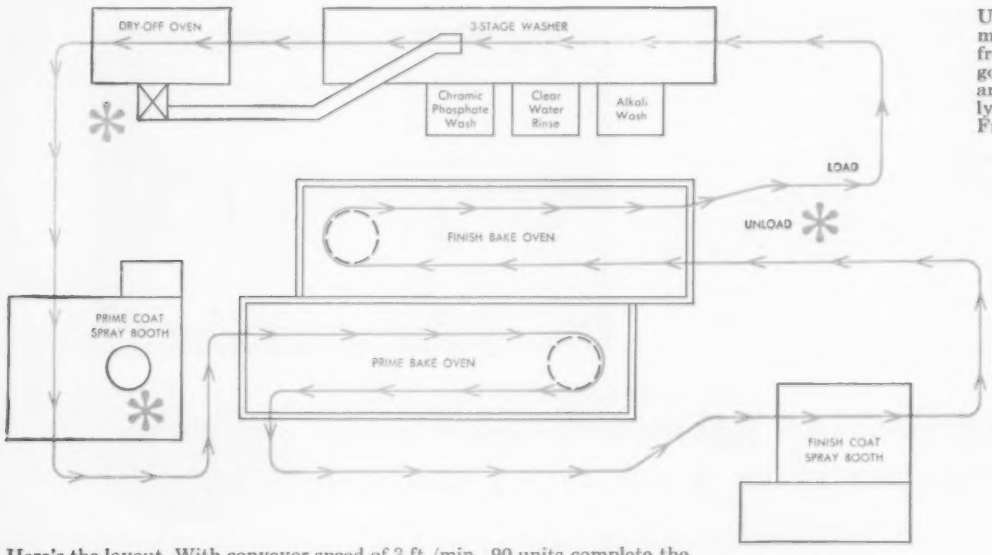
After automatic 3-stage power-spray cleaning and phosphate treating, units travel through dry-off oven, on the left.



Both prime and finish coats are applied manually with DeVilbiss spray guns. Shown here: prime coating in water-wash booth.



The system occupies less than 3200 sq. ft.; includes cleaning, and application and bake of both prime and finish coats.



Here's the layout. With conveyor speed of 3 ft./min., 90 units complete the cycle every hour. Water-wash booth with turntable, and a conveyorized dip operation for miscellaneous parts supplement the main system shown.

Uniformity of finish is a must at Fisher. "Panels from many separate runs go into cabinets like this, and must match perfectly," says Chief Engineer Frank Skowron *(left)*.

How to coat 16,000 shapes and sizes with speed and precision

That was Fisher Scientific Company's problem . . . and here's the DeVilbiss system that solved it

A laboratory is a complex of strange shapes . . . of equipment specialized to the *n*th degree.

Even so, it is astonishing to realize that the Instrument Division of the Fisher Scientific Company turns out a total of *80,000 separate components* in manufacturing the world's most comprehensive selection of scientific instruments, apparatus, and laboratory furniture.

Of these, about a fifth (16,000) get protective coatings . . . and the heart of Fisher's finishing department for this vast array of parts is the DeVilbiss conveyorized system you see here.

DeVilbiss worked closely with Fisher engineers to develop this remarkable new system. It has been in service for over a year, applying precision coatings that resist the powerful corrosives in laboratory use. It has proved its efficiency by absorbing the plant's continually increasing production load without a hitch.

With the industry's most complete line of surface-preparation and coating and finishing equipment to draw on, DeVilbiss can supply *you* with matched components in a system tailored to your particular requirements. It is the one "single source" fully qualified to analyze your needs, then let you select the best, most economical product combination to fit your job. May we serve you?

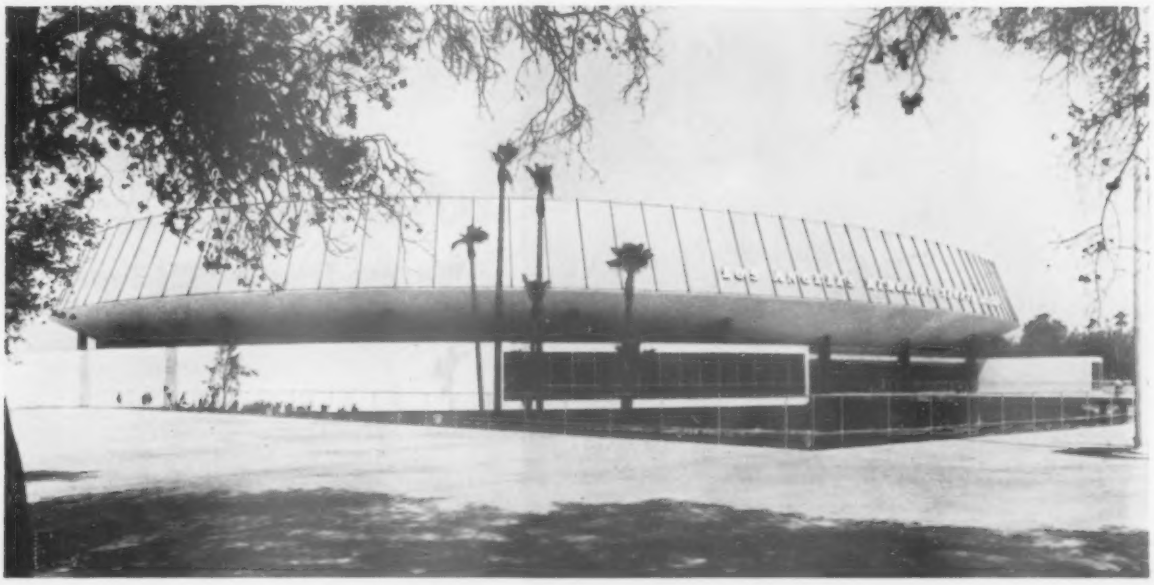
THE DEVILBISS COMPANY, TOLEDO 1, OHIO
Barrie, Ontario • London, England • São Paulo, Brazil
Branch Offices in Principal Cities

FOR BETTER SERVICE, BUY
DEVILBISS

INDUSTRIAL POWER WASHERS • OVENS • DUST COLLECTORS • MIST-COOLANT UNITS • SPRAY EQUIPMENT • HOSE & CONNECTIONS • FLOW & DIP COATERS • SPRAY BOOTHS • AIR COMPRESSORS

For more facts Circle 394 on Reader Service Card

FOR THE NATION'S MOST MODERN SPORTS ARENA... MODERN ELECTRIC MOTORS BY STERLING!



Equally suitable for sports events or convention meetings, the Los Angeles Memorial Sports Arena, site of the 1960 Democratic National Convention, is one of the nation's newest and largest public assembly buildings. Designed by Welton Becket and Associates, architects and engineers, for the Los Angeles Coliseum Commission, the Arena can accommodate up to 22,400 seats depending upon the type of event being held.

Because comfort is a vital factor in the use of the Sports Arena, every effort was made to insure that the air conditioning throughout the building would be unequalled in efficiency. Three basic air handling systems and two piping systems provide the necessary flexibility for the many variations in air conditioning loads that are required.

54 **STERLING** Electric Motors were selected to power the pumps, fans and air handling units. These alternating current, squirrel cage, drip-proof Sterling drives, ranging from 1 hp to 75 hp, provide quiet and dependable service... service that has made Sterling the name to remember for modern electric drives.

Only STERLING Multi-Shielded A.C. squirrel cage motors provide *all* these advantages:

- *Patented herringbone rotor* assures quiet operation.
- *Splash resistant enclosure* provides many times the protection required by NEMA standards... protects against dripping liquids and falling objects.
- *Sterling Multi-Shielded protection* also incorporates sealed leads and terminal box, double-shielded prelubricated ball bearings and labyrinth seal on output shaft... for long, trouble-free service life.
- *Direct through ventilation* results in cooler motor operation and prevents overheating.
- *Mechanical and electrical modifications* are available for virtually any special application.

For additional information about the unmatched advantages of Sterling Multi-Shielded Motors for *your* application, write for free copy of Bulletin 194.

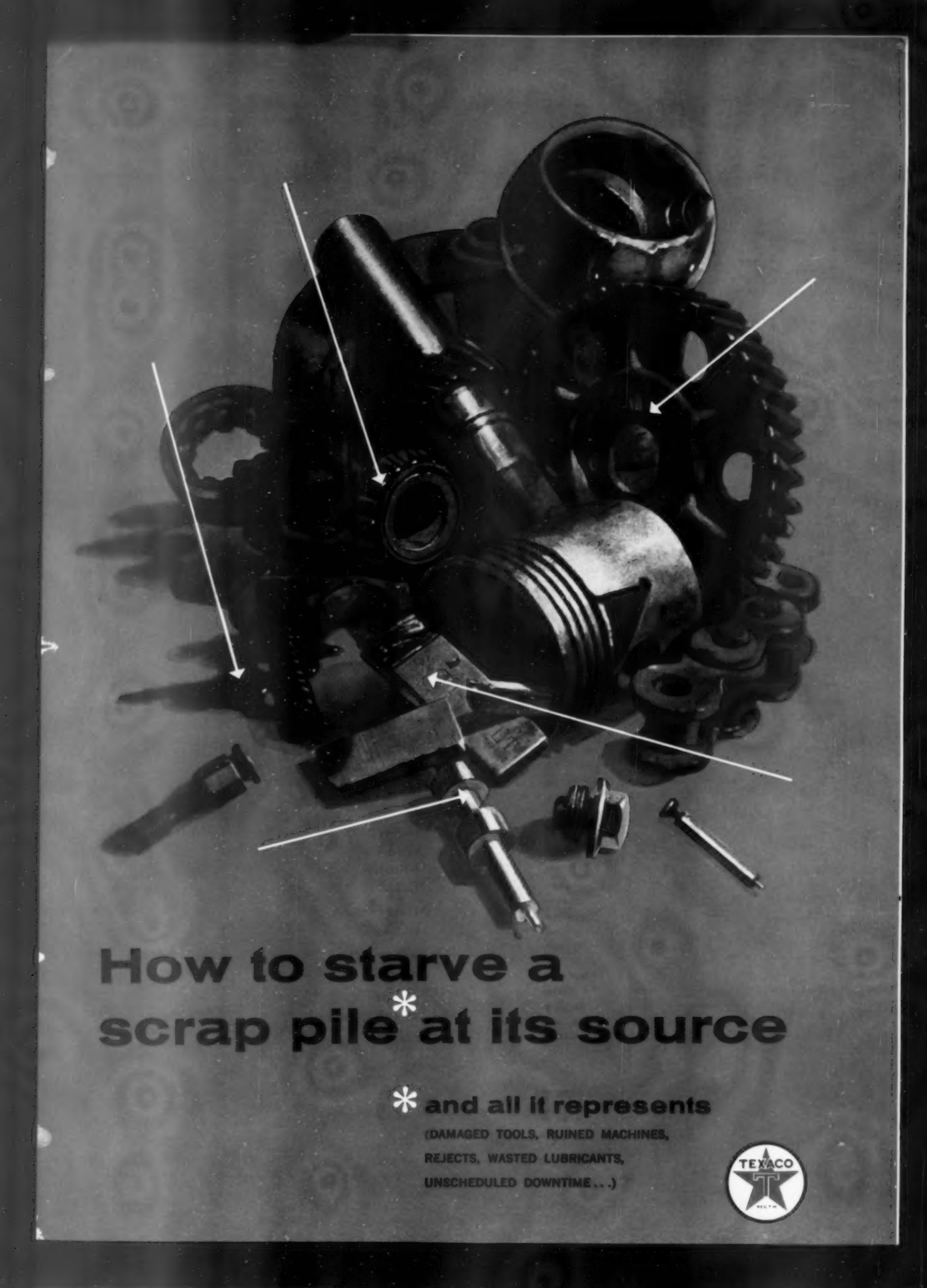
STERLING
ELECTRIC MOTORS, Inc.

Offices and stocks in all principal cities. Over 400 distributors throughout the country to serve you.

KEEP PACE WITH ELECTRICITY

5401 TELEGRAPH ROAD • LOS ANGELES 22, CALIFORNIA

For more facts Circle 395 on Reader Service Card
For more facts Circle 396 on Reader Service Card ➤


How to starve a
scrap pile* at its source
* and all it represents
(DAMAGED TOOLS, RUINED MACHINES,
REJECTS, WASTED LUBRICANTS,
UNSCHEDULED DOWNTIME...)
TEXACO

Start a "STOP LOSS" program

LUBRICATION IS A MAJOR FACTOR IN COST CONTROL

Texaco's "Stop Loss" program has been developed for progressive managers in production, maintenance, purchasing, engineering and accounting who wish to apply new methods to control costs and add to profits.

The program has two purposes: (1) to demonstrate how organization of lubrication practices can be used to control costs resulting from product rejects, downtime, machine repair, excessive inventory, and (2) to provide specific instruction material to help plant groups find out where and how they can use Organized Lubrication to control costs in their own operations.

Lubrication is common to almost all plant functions. So don't be surprised when the "Stop Loss" program reveals ways to save in many places!

START TODAY! cut down on your future scrap piles!

Just tear along this line

TURN PAGE FOR WHY

Expect tangible results!

HERE'S WHY AND WHERE:

In 1959, hundreds of plants organized their lubrication practices to reduce costs.

Their managements had recognized this fact: *Lubrication is no longer just a routine operating procedure. It is a key factor in controlling costs and, as such, rightly becomes a management function.*

This doesn't mean that management must put on overalls and grab a grease gun. But when management recognizes the dollars-and-cents significance of Organized Lubrication, they have made the first step toward reduced costs throughout the plant.

The Texaco Organized Lubrication Plan studies your lubrication methods in terms of long-range savings in production, equipment life, manhour utilization and inventory. A re-evaluation in terms of Organized Lubrication usually reveals how immediate savings can be made and continued.

Texaco has developed techniques and experience to make this new concept operative. They are offered to you, with the understanding that any Organized Lubrication program depends for success on those who adopt it and apply it.

Here's the help you need to starve YOUR scrap pile

Here are the parts of the Texaco Organized Lubrication Plan available to interested plant groups:

1. **"Stop Loss with Organized Lubrication,"** a new 25-minute color and sound film created to show the opportunities for cost control through "Organized Lubrication."

2. **A film "package" for plant departments.** This consists of movies on cutting oils, greases, hydraulic oils, etc., that may be selected for showing after seeing the "Stop Loss" film.

3. **Coordinated booklets** on the film subjects and others to be used as guides in specific areas.

4. **A Texaco Lubrication Control System** to take the guesswork out of your lubrication scheduling. This simple system costs almost nothing to install, yet can save up to 15 per cent of your maintenance costs.

We can promise you that a modern Texaco Organized Lubrication Program will produce a package of economies in your plant. Texaco Inc., 135 E. 42nd St., N. Y. 17, N. Y.

FROM

YOUR NAME _____

FIRM & ADDRESS _____

CITY _____ ZONE _____ STATE _____

FIRST CLASS
Permit No. 6990
New York, N. Y.

BUSINESS REPLY CARD

NO POSTAGE STAMP NECESSARY IF MAILED IN THE UNITED STATES

POSTAGE WILL BE PAID BY

TEXACO INC.

135 East 42nd Street

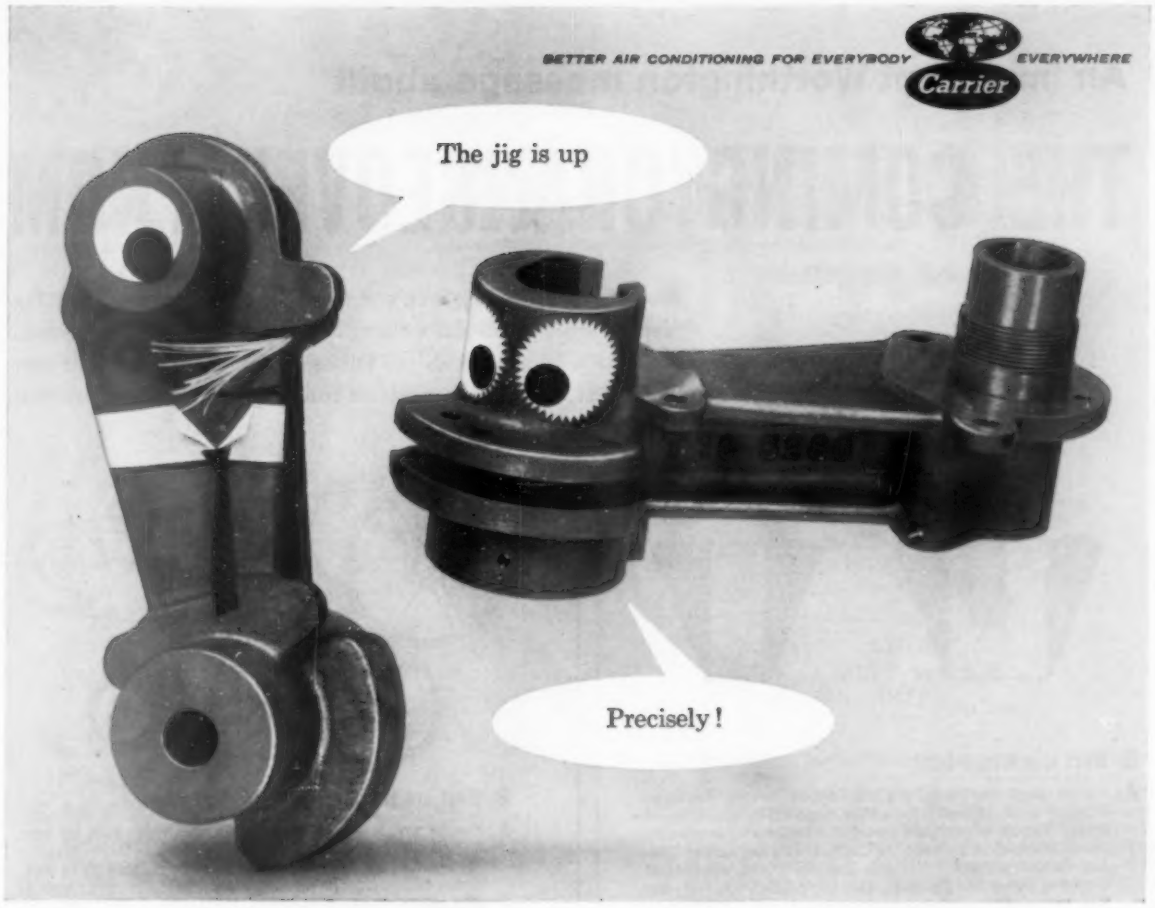
New York 17, N. Y.

DEPT. F-150

This is your ticket to see Texaco's vital new movie "STOP LOSS"

Sign and mail it today!

TEXACO



STAR TOOL EARNS 31% ANNUAL RETURN ON CARRIER AIR CONDITIONING INVESTMENT

Is comfort air conditioning in an industrial plant an unproductive luxury—a nice gift to the workers if you can afford it? Or is it a production tool—an investment that actually pays off in increased worker productivity?

The answer is a matter of record in scores of businesses. One of them is the Star Machine and Tool Company of Cleveland, a progressive small company in the precision tool industry.

Star installed Carrier air conditioning in its 20,000 sq. ft. plant in 1952 to stabilize the day-to-day accuracy of machining and produce to the ever-stricter tolerances required by modern industry. "As a result," says management, "we have been able to attain a degree of precision that once would have seemed utterly fantastic."

But what the company did not realize—at the time of installation—is that air conditioning increases the efficiency of men as well as the precision of machines. The annual productivity of Star workers soared 5.1%, absenteeism during summer decreased 14% and labor turnover dropped by 30%.

Taken together—and entirely apart from the increased precision which originally attracted management—these gains in worker productivity are giving the company a 31% annual return. Or enough to pay back the cost in about three years!

Will factory air conditioning pay off for you? The coupon below will bring you a booklet that describes four important yardsticks. Write for it today without obligation, then make your own decision. Carrier Corporation, Syracuse, New York.

To Carrier Corporation, Syracuse, New York. I am interested in receiving a copy of your booklet, "Will factory air conditioning pay off for me?"

Name_____

Company_____

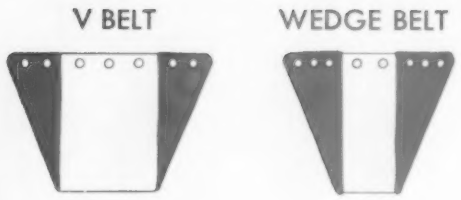
Address_____

City_____ State_____

An important Worthington message about

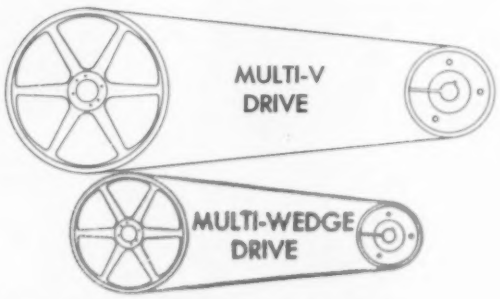
THE COMING CHANGEOVER FROM

Recently you may have seen a number of announcements promising "super" V-belt drives that are considerably smaller and less expensive. What these manufacturers are talking about, of course, is the new Wedge belt which will soon replace conventional V belts for new belt



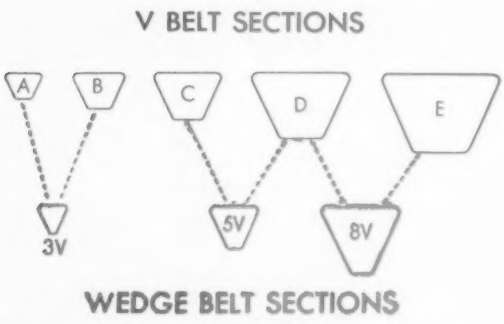
Q. What is a Wedge belt?

A. The cord layer near the top of a V belt carries the load. This layer, however, is only efficient in the portion supported by side walls (red areas). Because it is more of a pie shape, a Wedge belt increases the overall efficiency of a V belt. The Goodyear Tire and Rubber Company (manufacturer of Worthington-Goodyear V belts) was the first to offer a Wedge belt (in 1948). This fine product, however, was sold primarily for automotive applications.



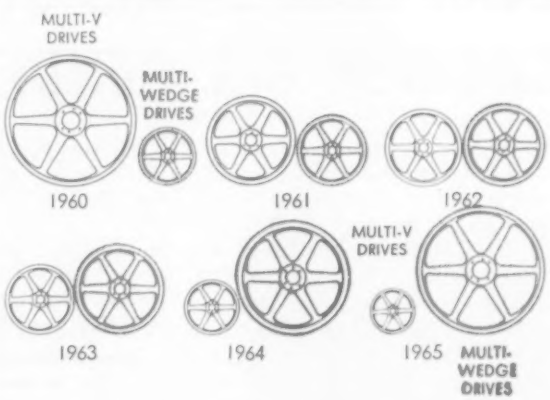
Q. What are the advantages of Wedge belts?

A. Smaller size, lower cost. Because the new Wedge belts are more efficient, you need fewer belts and smaller sheaves to carry the same horsepower load. Sheave diameters can be reduced 30 to 50%. Center distances can be cut 20%. And initial cost can be as much as 20% less.



Q. What belt sizes will be available?

A. Since the smaller Wedge belt does more work than the other V belt, it has been possible to reduce the number of sizes without loss of flexibility. The new Wedge belts will be available in three standard sections, 3V, 5V and 8V. The new nomenclature simplifies identification. The 3V belt is three eighths of an inch in width (measured at the top); the 5V belt is five eighths; the 8V belt, eight eighths, or one inch. Stock 3V and 5V sheaves will cover horsepower ranges up through 200 hp. Made to order 8V sheaves will be used for 200 to 2,000 hp. requirements.



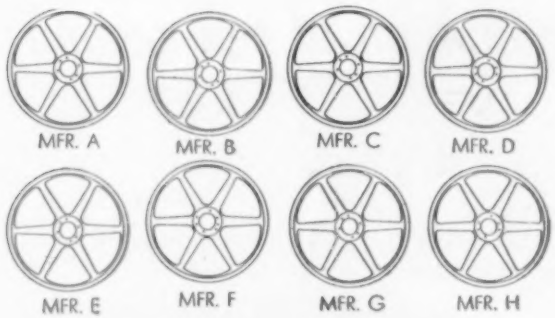
Q. Will multi-V drives continue to be available?

A. Worthington has no intention forcing any customer to switch to the new Multi-Wedge drive. The choice is up to you. We will continue to manufacture and stock both drives as long as there is a demand for both. We expect that many customers will need replacement belts and sheaves for Multi-V drives for many years. The chart above indicates how we expect the market to be divided in the years ahead.

MULTI-V TO MULTI-WEDGE DRIVE

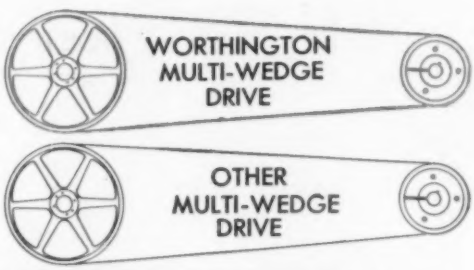
drive applications. On these pages Worthington—maker of the QD (Quick Detachable) sheave, the industry's largest seller—explains the significance of the coming change-over. If you would like more information please write to Worthington Corp., Section 79-25, Oil City, Pa.

WORTHINGTON



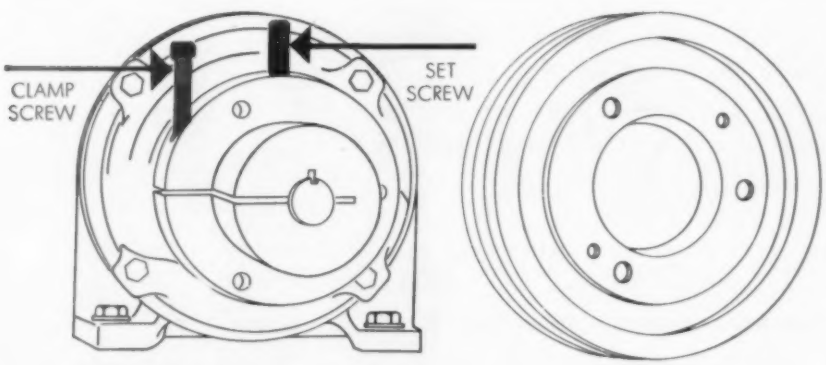
Q. Will all drive manufacturers make the changeover?

A. All indications are that the majority of Multi-V drive manufacturers are going to switch to the new Wedge belts. Of the eight leading builders, five (including Worthington) now also offer Multi-Wedge drives.



Q. Will different brands be interchangeable?

A. So far all Multi-Wedge drives introduced are being offered in the same belt and sheave sizes. Since Worthington and its QD licensees enjoy the largest share of the market, you can be doubly sure of having a dependable source of supply if you buy your Multi-Wedge drives from Worthington. All stock QD sheaves are being built to standardized dimensions by all QD manufacturers and are therefore interchangeable.



Q. Are all Multi-Wedge drives alike?

A. Whether you buy a new Multi-Wedge drive or the older Multi-V drive, the major difference between brands will be the quality of the belt and the method of locking the hub to the shaft. Worthington QD (Quick Detachable) sheaves, with their two Golden Screws are preferred by plant operators because of their positive locking arrangement.

The clamp screw simplifies installation and assures permanent alignment. You can install QD sheaves one part at a time. No heavy rim and hub combination to inch delicately into place. If change in speed is required, you simply install another sheave on the hub which remains anchored to the shaft. The clamp screw is an exclusive Worthington feature.

The set screw prevents "key drift." It locks the key securely in place, avoiding the danger of the key drifting off and becoming a safety hazard. Because of the exclusive clamp screw it is possible to use a set screw without causing hub distortion that might cause eccentric runout.

NOW! Fuses that...

Safely interrupt fault currents up to 200,000 amperes...

Limit fault current to very low values

Hold 500% load for minimum of ten seconds

Buss Low Peak fuses can completely revolutionize the protection of the entire electrical system.

Protect Mains, Feeders, Branch Circuits, Motors, Controllers, Switches—no matter whether the fault current is 1,000 amperes, 25,000, 100,000—or as high as 200,000 amperes.

Reduce stresses and prevent damage to Panel-boards, Switches, Motor Controllers—other circuit components—because let-thru fault currents are limited to exceptionally low values.

Prevent work stoppages, lights out, waste of time and money—because long time-lag keeps them from opening needlessly on motor starting currents or other harmless overloads.

Permit increasing interrupting capacity and current limitation on present system at minimum cost.

Before designing a new installation— or modernizing old installations—

GET ALL THE FACTS

Knowledge without action is of little value—but ACTION NOW may save you money—increase operating efficiency and reduce electrical hazards to a minimum.

BUSS LOW-PEAK fuses fit standard Switches and Panel-boards and are available in N.E.C. sizes from 15 to 600 amperes in both 250 and 600 volt ranges.

Write for BUSS LOW-PEAK Bulletin Now . . . or use coupon.

Bussmann Mfg. Division
McGraw-Edison Co.
St. Louis 7, Mo.

BUSS
Low-Peak
FUSES

Bussmann Mfg. Division, McGraw-Edison Co.
University at Jefferson, St. Louis 7, Mo.
Please send BUSS Low-Peak Fuse Bulletin LPS.

Name.....

Title.....

Company.....

Address.....City.....State.....

P-660

but only the Westinghouse Lamp has six

Despite similar appearance and ratings, these fluorescent lamps are *not* the same. One is a better lamp—and a better buy—because it's the only fluorescent lamp with all 6 advances described below. That lamp is made by Westinghouse. It costs you no more than any other leading brand—but it will give you years of trouble-free, efficient lighting.

1. **MORE EFFICIENT PHOSPHORS**—A special Westinghouse process selects Ultralume™ phosphor particles of a size proven to give more efficient lighting.

2. **BRIGHTER END TO END**—Lead wires are plated with super-hard Chrome Vanadium to make sure Westinghouse tubes *stay* bright, end to end.

3. **BUILT-IN "SHOCK ABSORBERS"**—Specially designed Westinghouse anodes act as buffers to cushion the terrific shock of electron bombardment and improve lamp life.

4. **"RAINCOATS" FOR RELIABLE STARTING**—Silicone "raincoats"

important advances that make it a better buy!

disperse moisture which can collect on exterior surfaces and prevent lamps from starting.

5. MIXED GASES — Westinghouse uses a precise mixture of certain rare gases, under exact pressure, to improve the light output.

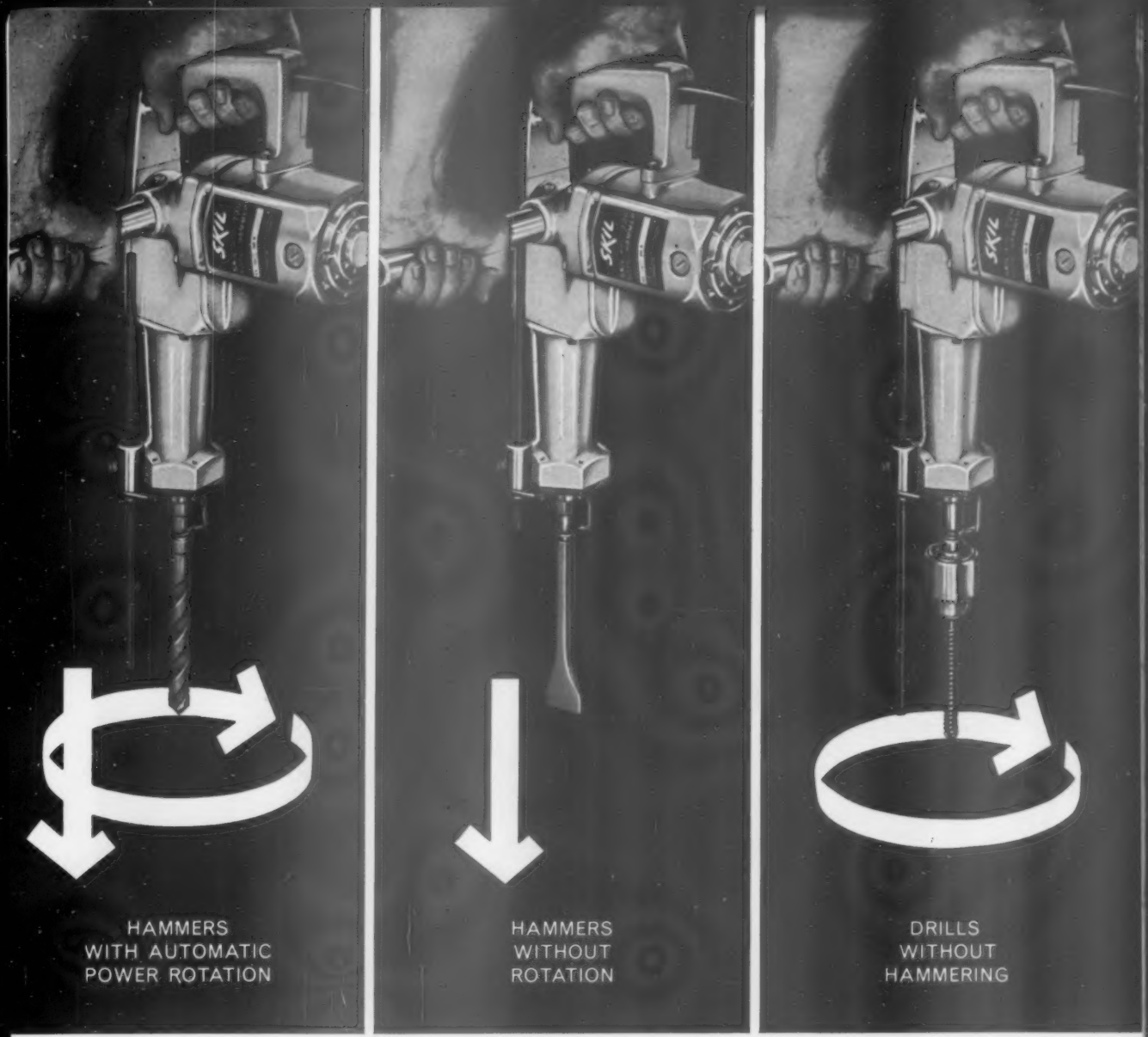
6. TRIPLE-COILED ELECTRODES — To protect electrodes from the sudden electron bombardment when the lamp is first turned on. Emission material is quickly heated, fully protected.

Regardless of the type or wattage of fluorescent lamps you buy, you will get better value, more light for your money, and longer, trouble-free service if you specify and insist on Westinghouse fluorescent lamps. Westinghouse makes a complete line, from tiny 4-watt lamps for instrument lighting to the giant 96-inch Super-Hi™ Lamps for store, street, and factory lighting. Contact your authorized Westinghouse lamp agent or nearest Westinghouse sales office.

YOU CAN BE SURE... IF IT'S Westinghouse

WESTINGHOUSE LAMP DIVISION, Westinghouse Electric Corporation, Bloomfield, N. J.

For more facts Circle 400 on Reader Service Card



New! Revolutionary Skil Roto-Hammer

Exclusive 3-way action obsoletes all other electric hammers!

It's actually 3 different tools in one:

Powerful hammer with automatic power rotation that drills holes in masonry up to 65 times faster than by hand . . . up to 5 times faster than ordinary hammers . . . without tiresome rotation of star drills.

Hammer without rotary action for all kinds of hammering jobs, including channeling, routing, chiseling, riveting, demolition work, setting self-drilling anchors.

Drill without hammering action for boring holes in masonry, wood, metal, or any material that can be drilled with standard electric drills.

Costs per hole are lowest of any hammer (see chart). Maintenance costs are lowest, too, because of unique "electro-pneumatic" drive. No springs to break . . . powerful hammering is air actuated.

Ask your Skil distributor for demonstration of Model 726 (½-1 inch) and Model 736 (1-2 inch). Or write for 8-page brochure. Skil Corporation, 5033 Elston Ave., Chicago 30, Ill. Attention: Dept. 107-C.

LOWEST COST PER HOLE
Based on 1000 holes (¾" x 4" deep) in masonry—labor at $3.00 per hr.

SKIL NO. 726 HAMMER	ORDINARY HAMMER
1 Carbide Bit* needed	24 Star Drills needed
19.38 hours of labor	100.4 hours of labor
$80.14 (labor & bit)	$337.20 (labor & bits)
8¢ per hole	34¢ per hole

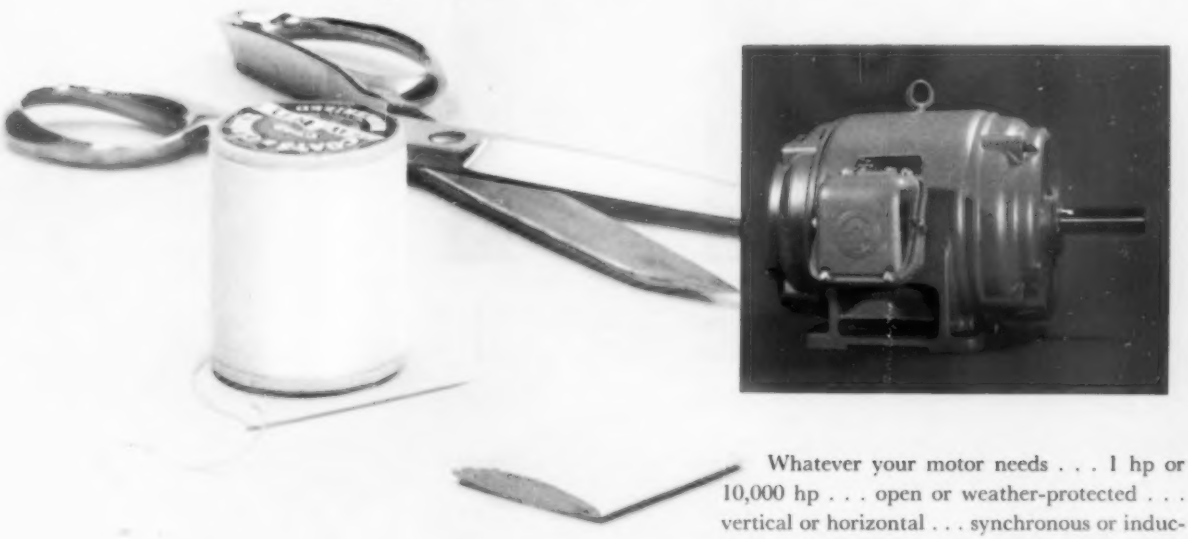
*New SKIL Carbide Bits stay sharp 20 to 30 times longer than star drills.

SKIL . . . and SKILSAW POWER TOOLS

For more facts Circle 401 on Reader Service Card

For more facts Circle 402 on Reader Service Card ➤

custom tailoring costs less than "ready-to-wear"



Buying an electric motor with "ready-made" insulation can be a costly luxury.

Motor operating conditions vary so widely throughout industry that Fairbanks-Morse insulation systems are *tailored* to actual operating conditions . . . not *standardized* to "the average".

"Ready-made" insulation systems are an "across-the-board" compromise with *average* operating conditions. When *your* case is the all-too-frequent exception, the compromise is costly.

Even in "hard to fit" cases we build motors rated, dimensioned and insulated to furnish unfailing power. Insulating materials are carefully tested, selected, treated and prepared so that insulation as well as motor enclosure is *matched* to the job. Entire insulation system is custom tailored to meet emergency overloads, temperature extremes, corrosive atmospheric conditions . . . whatever combination of factors affects motor life and performance of your *specific* operation.

This *flexible* application of varied insulating materials and processes "pays off" in low maintenance, uninterrupted production, prolonged service.

Whatever your motor needs . . . 1 hp or 10,000 hp . . . open or weather-protected . . . vertical or horizontal . . . synchronous or induction . . . AC or DC . . . Fairbanks-Morse builds it, builds it right, builds it to last. Get the facts . . . drop a line today to: Fairbanks, Morse & Co., Freeport, Illinois.

Fairbanks, Morse

ELECTRICAL DIVISION

A MAJOR INDUSTRIAL COMPONENT OF **FAIRBANKS WHITNEY CORPORATION**

This "KENTUCKY TEAM" will work for YOU!

These "men at work" are one of the most unique and effective groups in the world of industrial development.

Each is a professional industrial-development expert employed by one or another of the great utilities or transportation companies within Kentucky. As members of "The Kentucky Team" of the Kentucky Chamber of Commerce, they have but one function and one goal—*to help YOU select the Kentucky plant-site which will ideally meet your requirements, without regard to their own companies' individual areas or interests.*

THE "KENTUCKY TEAM" DOVETAILS WITH THE KENTUCKY DEPARTMENT OF ECONOMIC DEVELOPMENT

Itself a unique organization, The Kentucky Team's association with the Kentucky Department of Economic Development is, again, an inspiring example of co-operative teamwork *to help you find your perfect location in Kentucky.*

Recently expanded and enlarged, the Kentucky Department of Economic Development is one of the nation's truly great industrial development projects. It operates six separate Divisions:

Industrial Development Division: Analyzes the requirements of specific industries and recommends Kentucky locations which will best meet their particular needs.

Economic Research Division: A "one-stop" source for data on any phase of the Kentucky economy.

Maps and Minerals Division: Offers recent topographic maps, covering every square inch of Kentucky—also provides information on the water, mineral and topographic advantages.

Agricultural Development Division: Compiles and disseminates full details on Kentucky's special agricultural opportunities.

Community Development Division: Devotes itself exclusively to helping Kentucky cities and towns to get organized and prepared for industry.

Planning and Zoning Division: Provides professional assistance to local planning and zoning commissions.

If you are considering a new plant, we urge you to enlist the services of The Kentucky Team and the Kentucky Department of Economic Development. *We believe you will be amazed at the results this combined task force can show you.*

Address: Lt. Gov. Wilson W. Wyatt or W. E. Kennedy, Commissioner' Dept. of Economic Development 500 Capitol Bldg., Frankfort, Ky.

RAYMOND E. BISHA
Director of Industrial Development
Louisville and Nashville Railroad Co.
Louisville

DONALD E. BUCHANAN
Director of Industrial Development
Kentucky Utilities Company
Lexington

GLOVER CARY
Manager, Industrial Development
Texas Gas Transmission Corp.
Owensboro

CURTIS CRAIG
Director of Public Relations
Louisville Gas & Electric Co.
Louisville

A. R. CURTIS
Industrial Sales Engineer
Columbia Gas of Kentucky, Inc.
Charleston, W. Va.

G. W. EDLER, JR.
General Industrial Agent
Southern Railway System
Washington, D. C.

J. S. FROST
Director of Industrial Development
Illinois Central Railroad
Chicago, Ill.

WILLIAM NEAL
Manager, Industrial Development
Western Kentucky Gas Company
Owensboro

W. H. ROOKER
Industrial Representative
The Chesapeake & Ohio Railway Co.
Huntington, W. Va.

RUFUS P. THOMAS
Industrial Development Representative
Kentucky Power Company
Ashland

JAMES A. WUENKER
Industrial Development Division
Union Light, Heat and Power Co.
Covington

J. C. ZIMMERMAN
Director of Industrial Development
Kentucky Chamber of Commerce
Louisville

LEONARD T. KERNEN
Director of Industrial Development
Department of Economic Development

COMMONWEALTH OF
KENTUCKY
WHERE BIG THINGS ARE HAPPENING

For more facts circle 403 on Reader Service Card

In commerce and industry today no blueprints for new construction, no plans for remodeling can ignore the concept of traffic flow as an integral function of architecture. One of the boldest expressions of this idea in years is the American Air Curtain.

...an entrance that's sealed against wind and weather, heat and cold, odors and insects—*against everything but people!* It's that imaginative innovation in architectural engineering, the American Air Curtain.

A gentle curtain of air, thermostatically controlled, separates and insulates spaces with different temperatures, atmospheric pressures or humidities.

Since 1952 the American Air Curtain has transformed stores, theaters, public and industrial buildings of all kinds. Doesn't this fit a functional need in your business? Write for complete information on the dramatic commercial and industrial uses of the American Air Curtain . . . made by the first and the most experienced manufacturer of air curtains.

PEOPLE AND PRODUCTS MOVE THROUGH THE CLOSED DOOR THAT'S ALWAYS OPEN

SUBSIDIARY OF UNIVERSAL MATCH CORPORATION

AMERICAN AIR CURTAIN CORPORATION
472 PAUL AVENUE, ST. LOUIS 35, MISSOURI

For more facts Circle 404 on Reader Service Card

When you see an eight-eyed spider...

call an *ARANEOLOGIST*

(specialist in spiders)

when you've got welding problems... call in *LINCOLN*

(specialists in arc welding)

A SOUTHERN sheet metal fabricator had "burn-thru" in the welds. The LINCOLN Field Engineer recommended Fleetweld 37 and licked the "burn-thru" problem. But more important, the new electrodes increased welding speeds to such an extent that overall costs dropped a third.

And right there is a good reason for doing business with LINCOLN. Ideas to whip knotty production problems come naturally to the Field Engineers. They are factory-trained where they—and everyone else—gets paid according to his individual contribution to the company's goal—superior products and service to you at continually decreasing costs. So, while he knows welding, he also understands how to relate it to your total manufacturing operation.

That's why we say it's a good idea to do business with LINCOLN where arc welding is a specialty and cost reduction comes to you as a "plus" at no charge.

THE LINCOLN ELECTRIC COMPANY
Dept. 1820 • Cleveland 17, Ohio

LINCOLN ELECTRODES

"Here at ST. REGIS we're kraft linerboard

—WHAT ABOUT MAINTENANCE?
Only OTIS can offer "minutes away" maintenance and engineering service wherever you are—through offices in 297 cities across the United States and Canada.

men . . . not elevator maintenance men"

DAVE ROBERTS
Plant Engineer
ST. REGIS PAPER COMPANY
Jacksonville, Florida

"Here at ST. REGIS, ours is the specialist's approach to paper making. We know exactly what it takes to make quality Seminole Kraft Linerboard. It has been our business for years.

"It's the same with our OTIS Elevators. We have three of them. Two are used primarily as passenger elevators but they also handle light freight. The third, and most critical, is a 30,000 pound duty OTIS Hydraulic Freight Elevator. It is used to keep our finished output moving. Shutdowns would be costly.

"As specialists in maintaining paper making machines, we decided from the start that the OTIS specialist's approach to elevator maintenance was the best way to keep our elevators running. We have been well satisfied with our choice since 1953."

What is the OTIS specialist's approach to elevator maintenance?

It is MEN . . . MATERIALS . . . METHODS.

MEN: Elevator maintenance is no one-man job. It is an organization task requiring experts in many lines. No individual, even if he devoted his entire time to the job, could do it properly. It calls for men with an unusual combination of skills plus long training in studying parts, assemblies, functions, replacement procedures, testing and adjusting.

How much of the complete elevator installation does OTIS manufacture? Everything! Over 28,000 original and always available replacement parts. From the smallest switches in the machine room to the finished cars and entrances—to make certain that every OTIS installation performs as a completely integrated unit.

freight elevator maintenance

THAT KEEPS ELEVATORS RUNNING LIKE NEW

OTIS ELEVATOR COMPANY • 260 ELEVENTH AVENUE • NEW YORK 1, N.Y.
OFFICES IN 297 CITIES ACROSS THE UNITED STATES AND CANADA

For more facts Circle 406 on Reader Service Card

. . . framing for storage racks.
. . . custom-built storage bins.
. . . ideal for catwalks and split-level storage.
. . . sturdy work tables, work benches.

REPUBLIC
METAL LUMBER

the building product of 1000 and 1 uses . . .

LET REPUBLIC HELP YOU SOLVE STOCK AND STORE PROBLEMS . . .

REPUBLIC SRK PLASTIC PIPE has the high degree of quality essential in severe corrosion applications. Republic has the know-how and facilities —works full time to bring you plastic pipe that performs better, longer, at lowest possible cost. Write for additional information.

REPUBLIC STEEL LOCKERS improve employee relations with clean, attractive dress-wash-change facilities. Big and roomy interiors. Strong and sturdy—made of steel—protects tools and personals. Bonderized. Republic will help you with your locker planning.

REPUBLIC STEEL PIPE. Your Republic distributor has it—all sizes and weights—high, dry, rust-free, ready for delivery. Black or galvanized, uniform from end-to-end. Cuts, threads, bends easier . . . installs faster, resists corrosion longer. Send for additional information.

. . . solves hard to-stock-storage problems.

. . . framing for raceways, cable supports, piping systems, and framework for lighting fixtures, mounts, distribution systems, control panels, and other shop framing applications.

Republic METAL LUMBER — for faster, stronger, safer framing in any application where common building materials are now used.

Faster—simply measure, cut, assemble. *Stronger, Safer*—fabricated from cold rolled steel to assure uniform physical properties and high strength-to-gage ratio. Bonderized for complete protection of all exposed surfaces. Engineered slotted angle pattern speeds erection, reduces time and material costs.

Available in two gages, two widths, in standard bundles of 10- or 12-foot lengths. Call your Republic representative. Or, send for attractive brochure.

. . . framing members for overhead storage.

REPUBLIC STEEL

REPUBLIC STEEL

World's Widest Range of Standard Steels and Steel Products

For more facts circle these numbers: 407 Metal Lumber, 408 Steel Lockers, 409 Plastic Pipe, 410 Steel Pipe.

REPUBLIC STEEL CORPORATION
DEPT. FA-9693-A
1441 REPUBLIC BUILDING • CLEVELAND 1, OHIO

Please send more information on the following products:

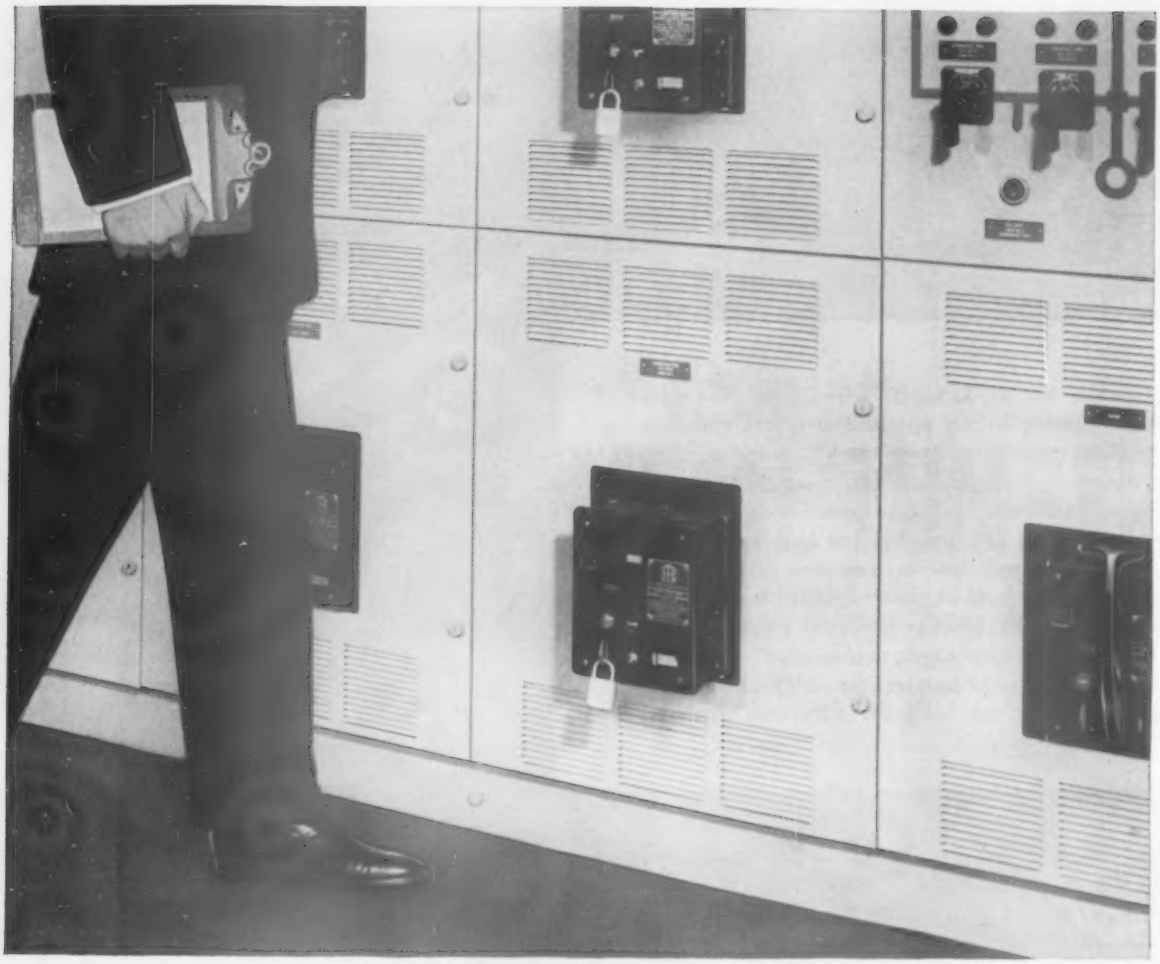
- ☐ Republic METAL LUMBER®
- ☐ Republic SRK® Plastic Pipe
- ☐ Republic Steel Lockers
- ☐ Republic Steel Pipe
- ☐ Please have a Republic representative call

Name_____ Title_____

Firm_____

Address_____

City_____ Zone____ State_____



Several of these circuit breakers are in the disconnected position. Yet the doors are safely closed. Wouldn't you like this feature in the switchgear you are going to live with for 20 years?

Why stumble over a circuit breaker door for 20 years?

Don't let yourself be pushed around by a 600 volt switchboard. Fight back. Insist on equipment that lets you rack the breaker out to test or disconnect position without ever opening the door . . . completely safe equipment with no live parts exposed and no open doors to admit dust (see maker's name below).

Only one make of 600 volt switchgear offers this advantage (see name below). In 1957, when this line was introduced, it was the first to give you the miracle of manual stored energy closing. Today, naturally, you expect stored energy in any make of switchgear you buy.

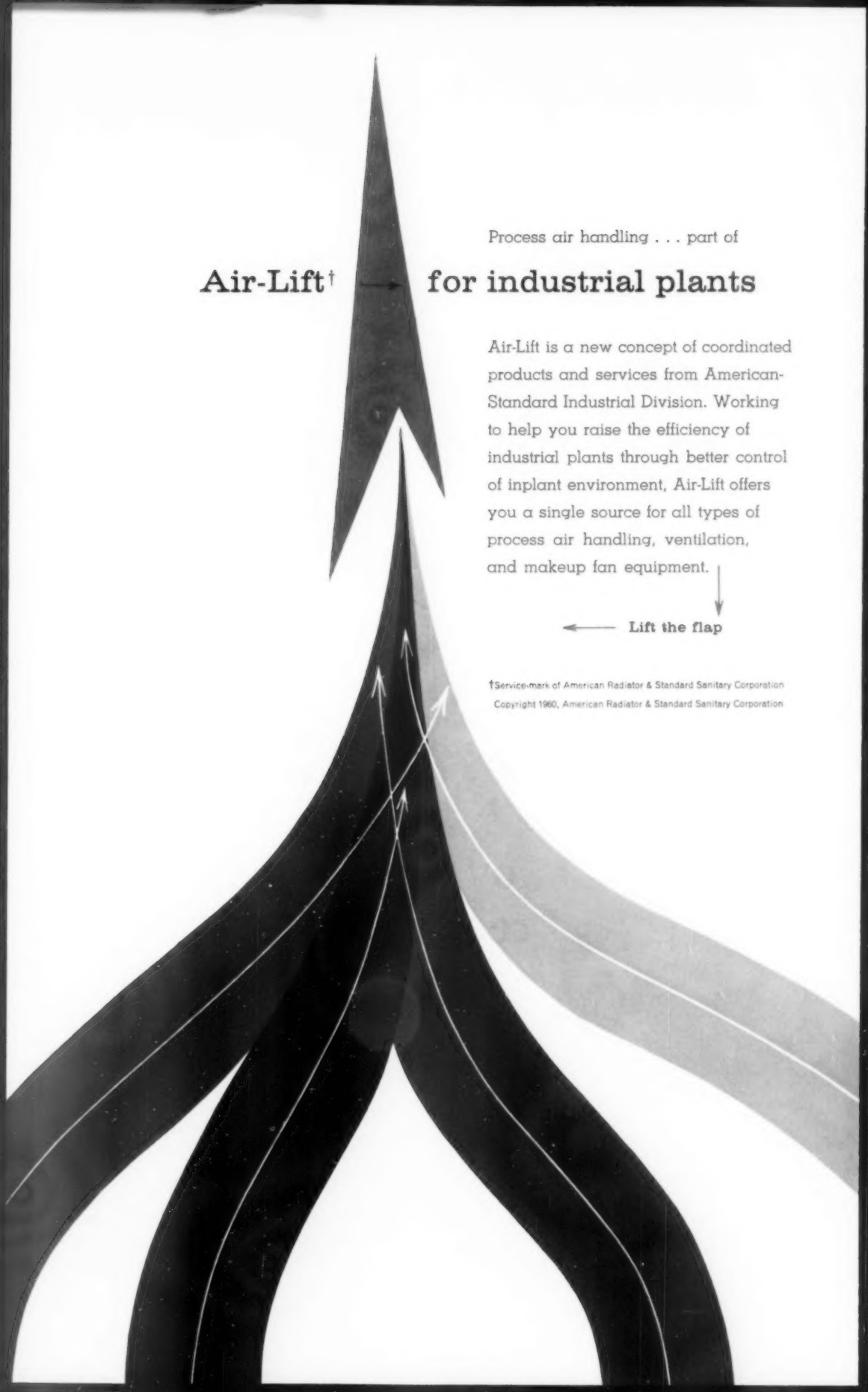
But only this one company (see below) offers the additional advantages of completely closed door disconnect, plus expanded range trip devices that let your breakers grow with your loads. Each trip device has three to four times the range of conventional devices. Saves both cost and downtime.

The surprise is that you pay no more for this—today's most advanced 600 volt gear. Why settle for anything else? For complete descriptive Bulletin 6004-C, write I-T-E Circuit Breaker Company, Dept. SW, 1900 Hamilton St., Philadelphia 30, Pa.

I-T-E CIRCUIT BREAKER COMPANY

For more facts Circle 411 on Reader Service Card

For more facts Circle 412 on Reader Service Card ➤



Process air handling . . . part of

Air-Lift† for industrial plants

Air-Lift is a new concept of coordinated products and services from American-Standard Industrial Division. Working to help you raise the efficiency of industrial plants through better control of inplant environment, Air-Lift offers you a single source for all types of process air handling, ventilation, and makeup fan equipment.

Lift the flap

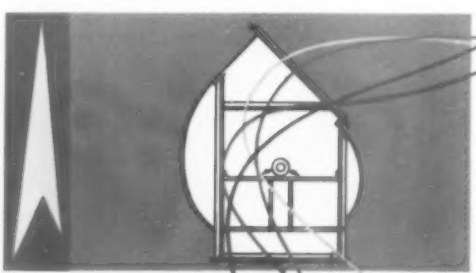
†Service-mark of American Radiator & Standard Sanitary Corporation

Copyright 1960, American Radiator & Standard Sanitary Corporation

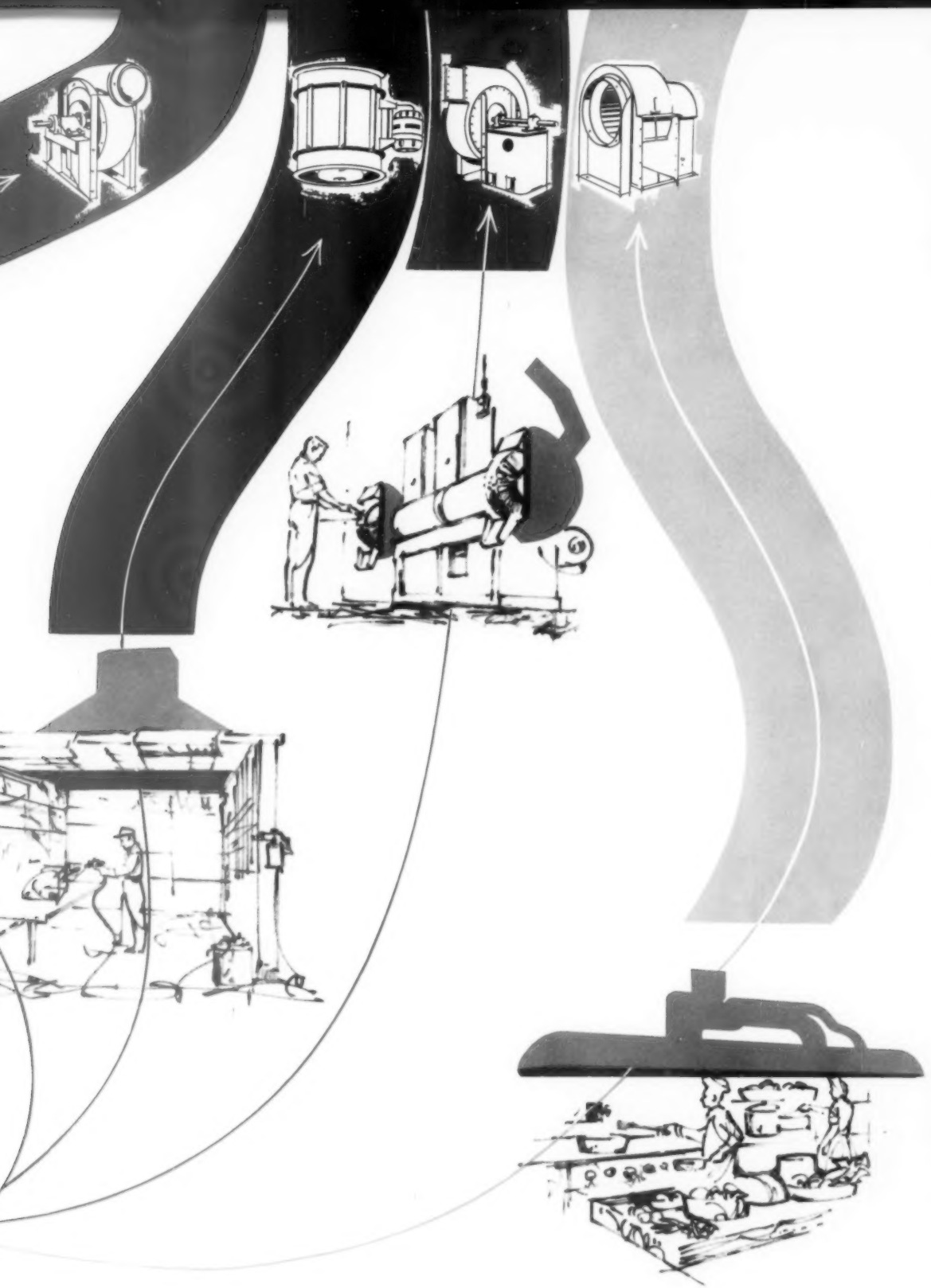
Knowing which fan and why

is the secret of efficient air handling for industrial plants. That's where we come in. Whatever the process, contaminant, or size of the plant, we can offer you the right fan for the duty and tell you why it's right. The reason: We make standard and custom fans for every type of industrial duty — rugged fans that give top efficiency with minimum maintenance. And obtaining all your air-handling components from a single source makes things more convenient for you. You nail down responsibility for delivery, performance, service. You save hours of interview time. You work with experienced product specialists who can give you the very latest in fan developments along with special equipment information. Also, you get an integrated system, because the units are designed to work together. So, next time you're wondering which fan . . . and why . . . give us a call. We have the answer.

In fact, American-Standard Industrial Division has the equipment answers for all your air-handling, heating, air-conditioning, and air-pollution-control problems. It's a single source for all the system components needed by the modern industrial plant for complete year-round environment control.



American-Standard Industrial Division
Air-Lift in action



Corrosion-resistant Type "V" fans, available with a great variety of special coatings *Axial fans designed for processes requiring straight line air flow* *Industrial fans with wheel types for handling air, fumes, and gases or materials* *Utility sets in a wide range of capacities for supply or exhaust* *HS fans with single or double inlet wheels for makeup air systems.*

One-source responsibility. . . the heart of American-Standard Industrial Division's Air-Lift Service. Now — with the combined American Blower, Ross Heat Exchanger, and Kewanee Boiler product lines—American-Standard* Industrial Division offers all the major components for complete, integrated systems to control inplant environment. You benefit by getting air-conditioning, air-handling, heating, and air-pollution-control equipment designed, engineered, and manufactured to work together. And, most important, you have one-source responsibility for its quality and performance. Offices in all principal cities are staffed by product specialists whose practical knowledge of equipment selection and application may prove most helpful to you. American-Standard Industrial Division, Detroit 32, Michigan. In Canada: American-Standard Products (Canada) Limited, Toronto, Ontario. Export Division, American-Standard, New York City.

AMERICAN-Standard
INDUSTRIAL DIVISION

AMERICAN BLOWER PRODUCTS • ROSS PRODUCTS • KEWANEE PRODUCTS

PRODUCTS DESIGNED / ENGINEERED / MANUFACTURED TO WORK TOGETHER

Air conditioning — Centrifugal refrigerating machines Central station units • Fancoil units Self-contained air conditioners • Package water chillers • Multi-zone air conditioners • Sprayed coil dehumidifiers Heating and cooling coils • Air washers

Air handling — Industrial fans with wheel types for handling air, gases, materials, and shavings • Centrifugal, propeller, tubeaxial, and vaneaxial fans • Utility sets Power roof ventilators • Centrifugal compressors • Specialized fans, blowers

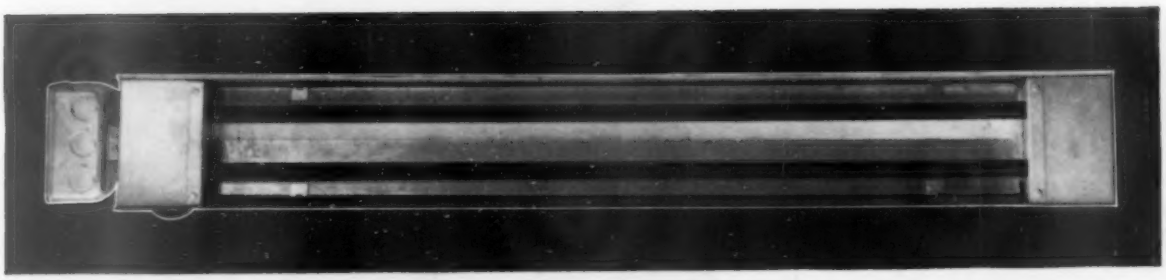
Heating — Firebox, scotch-type steel boilers and package units for heat, process steam Vertical, horizontal unit heaters for steam, hot water • Heavy-duty heating coils • Industrial unit heaters • Heating and ventilating units • Cabinet heaters

Air pollution control — Dust collectors and fly ash collectors for eliminating dust and recovering fly ash Cyclone-type centrifugal dust collectors Disposal systems • Tubular-type centrifugal collectors • Package units Electrostatic precipitators

Power transmission — Gyrol® Fluid Drives for stepless, adjustable-speed control of driven machinery Complete range of sizes, 1 hp thru 12,000 hp • All provide extremely smooth pickup of the load for maximum protection of motor and machine

Heat transfer — Standard and engineered heat exchangers, condensers, and feed-water heaters for every requirement • Oil and gas coolers • Refrigeration condensers and coolers • Instantaneous water heaters for service-water, booster, convertor duty

*American-Standard and Standard® are trademarks of American Radiator & Standard Sanitary Corporation



VYCOR® GLASS HEATERS WITH THE BUILT-IN REFLECTOR

NEW

The VYCOR heater emits a radiant energy that is so easily converted to heat, you get up to 90% of your original input back in finished work.

We call this energy *far* infrared. It is in the long wave length range and there is little if any short wave length emission. There is practically no reflection of long wave heat.

Therefore, this energy is 20 to 60% more efficient than that given off by some other sources of radiant energy.

You can put up to 23 watts per square inch of this effective energy on a work surface with our new VYCOR tubular heaters. Resistance coils heat the glass. The glass emits energy. A triple-reflector design makes these dryers even more efficient by focusing heat directly on your products. Fiberglas® insulation reduces heat loss to a minimum.

FAST HEAT-UPS. It takes just three minutes to bring a VYCOR heater to peak temperatures. Cool-downs are equally fast.

COMPLETE WITH HARDWARE. VYCOR heaters are all wired and ready to work. You hook in your circuit, throw a switch, and you're set to heat.

*TM Owens-Corning Fiberglas Corporation

OTHER ADVANTAGES. VYCOR heaters give you clean heat. There's no corrosion or flaking problem.

The glass in VYCOR heaters takes massive thermal shocks without breaking, so you can use these heaters with splashing liquids.

These heaters have only a 10% current surge on start-up. You can use switchgear with the same rating as the heater itself.

PANEL HEATERS, TOO. Our PYREX® panel heaters work on much the same principles. These panels produce an exceptionally uniform heat . . . even over wide areas. They have no hot or cold spots.

NEW BULLETIN. We've packed a 16-page bulletin with facts about both VYCOR and PYREX radiant heaters . . . with the theory of their radiant operation, design details and other specifications, and instructions on how to set them up. For a copy, write to our Plant Equipment Sales Department, 23 Crystal Street, Corning, N. Y.

CORNING GLASS WORKS

CORNING MEANS RESEARCH IN GLASS

HEAT SOURCE

THERE IS NO MARK LIKE YOUR OWN

If we, as builders of marking equipment, could devise an identification marking method that even came close to the simplicity, universality and distinctiveness of fingerprints—we'd have solved a fair share of our customer's problems in a single stroke.

But the wide variety of products and packages industry has to mark calls for an almost unbelievable number of different printing methods, feeds and ejections, type elements and specialty inks. What will automatically color band diodes or resistors at high speed is nothing like the right combination for imprinting bakery labels . . . or stamping shoe linings . . . or marking vitamin capsules . . . or decorating children's cowboy boots. If they're going to do a good job for the user, they must each be precisely the right combination of machine, type, ink and method.

When you use such a marking method, labor is at a minimum — inventory is simplified — identification of your product and your company is positive and lasting. Since there is no mark quite like your *own*, are you using yours to best advantage? Markem Machine Co., Keene 18, New Hampshire.

EVERYTHING INDUSTRY NEEDS . . . FOR PROFITABLE MARKING . . . SINCE 1911

MARKEM

For more facts Circle 414 on Reader Service Card

For more facts Circle 415 on Reader Service Card ➤

PICTURE THE PLACES WHERE YOU CAN USE LION Nōkōrōde. PROTECTIVE COATINGS

Do you need a non-breathing moisture-vapor barrier over insulation or to protect metal, masonry or other surfaces against atmospheric corrosion, weathering or immersion in water? Use Lion Nokorode Seal Kote.

Do you need an *insulating* coating which will deliver enough heat saving in one year to pay for its cost—plus protecting against corrosion and moisture penetration? Use Lion Nokorode K Kote.

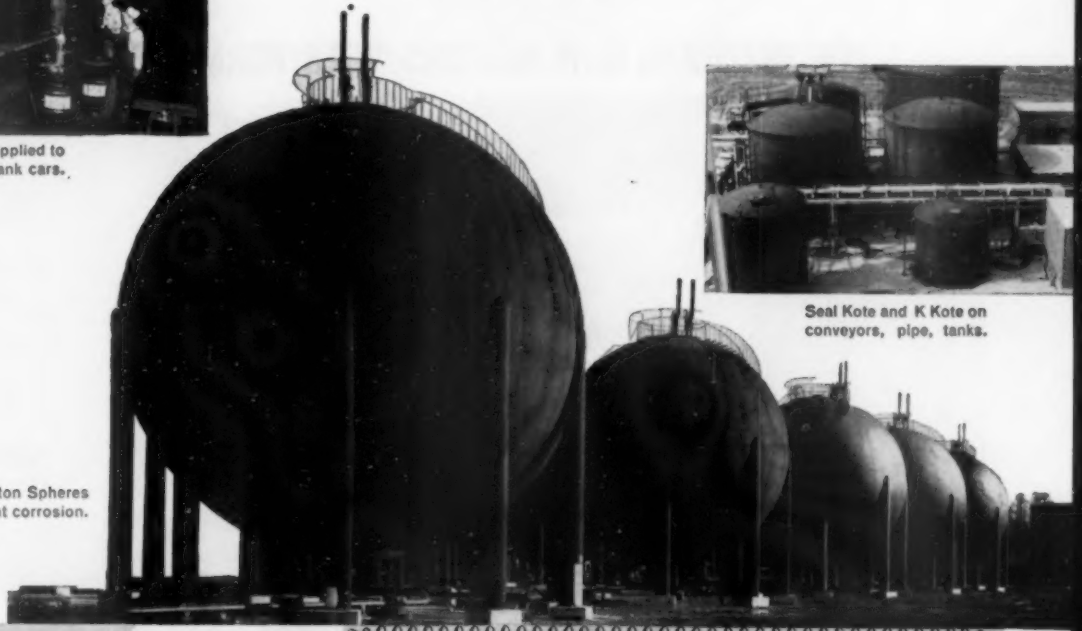
These tough, durable coatings can be sprayed onto regular or irregular surfaces—faster than most coatings, with proper equipment. They adhere at any angle, and change shape without rupturing.

Lion Nokorode Coatings—as complete a line as you can find—are the products of continuing research by Lion and its parent company, Monsanto Chemical Company. Lion Nokorode products have been proven in use around the world, and are constantly being improved in the light of research and use.

Lion offers you on-the-job helps and the most complete file of technical literature in this field. Tell us your problem. We will send you the technical information which applies. Just mail the coupon below.

Seal Kote being applied to liquid chemical tank cars.

Seal Kote and K Kote on conveyors, pipe, tanks.



Seal Kote on Horton Spheres to prevent corrosion.

K Kote on soap and black liquor tanks at pulp mill.

Protective Coatings Section
LION OIL COMPANY
A Division of Monsanto Chemical Company
El Dorado, Arkansas

My protective coatings problem is .....

.....

Please send me the appropriate technical literature.

NAME .....

COMPANY .....

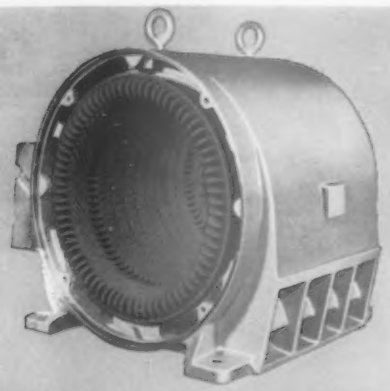
ADDRESS .....

CITY ..... STATE .....

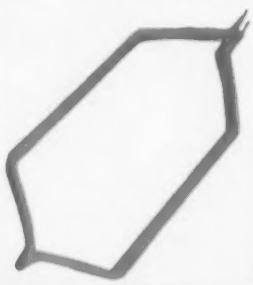
UNEXCELLED PROTECTION

for vulnerable motor coils

FOR INTEGRAL H. P. MOTORS WITH FORM-WOUND COILS



WOUND STATOR—Core and frame are dipped in EPA-SEAL epoxy resin and baked before winding. Slot cells are epoxy-glass, and all connections are taped with epoxy-mica and glass tape. After winding, the entire stator is given the EPA-SEAL vacuum-pressure process described below.



IMPREGNATED COIL—Finished coil is entirely covered with glass tape before impregnation. Where leads leave the coil, special epoxy compound seals against entrance of moisture. The entire slot section is protected by epoxy-mica wrapper.

NOW OPERATING. One of the first epoxy-insulated, form-wound motors in service was the 350 hp Epa-Seal motor shown below. It operates under severe corrosive atmospheric conditions, plus constant spray from nearby cooling tower.

The Elliott EPA-SEAL epoxy insulation system for integral hp motors includes the application of epoxy resins to all vulnerable parts, and a unique process of vacuum preconditioning and pressure impregnation. Vacuum preconditioning is accomplished by placing wound stators in a tank which is sealed and evacuated. This removes all air and moisture from within the coils and coil slots.

Then while still under vacuum, impregnation is accomplished by pumping special epoxy resin into the sealed tank under pressure. The combined vacuum and pressure treatment assures deep penetration of the resin into the innermost spaces of the coils and coil slots. The result is a tough, impervious, resilient, void-free protection against salt water, acids, alkalis, solvents, cutting oils, carbon-black, abrasives. This exclusive Elliott C-W insulation withstands heat, cold, vibration, resists chipping and cracking, takes cold shock and thermal cycling unharmed. EPA-SEAL epoxy-insulated motor stators with form-wound coils have been completely submerged in water for three months without impairment of insulation resistance or dielectric strength.

Elliott's tough, resilient

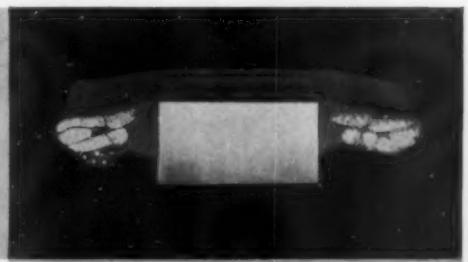
EPA-SEAL

epoxy insulation system

FOR INTEGRAL H. P. MOTORS WITH RANDOM-WOUND COILS

ENCAPSULATED STATOR—Entire wound stator is encapsulated in EPA-SEAL epoxy resin by vacuum-pressure impregnation. Epoxy resin fills slots completely, penetrates coils. Protects laminations, too.

Note in sectioned stator core below how EPA-SEAL completely fills the slots. All conductors are completely encased by this unique epoxy insulation system.



NO VOIDS—Vacuum preconditioning and pressure impregnation assure void-free insulation. Phase insulation is entrapped in the epoxy resin, which even penetrates into lead sleeving. Note how EPA-SEAL bonds to the stator core, seals against moisture. Relatively thin build-up over coils permits rapid dissipation of heat from conductors.

For motors with random-wound coils, the method customarily used for encapsulating consists of applying an external coating over exposed coil ends. But with the Elliott EPA-SEAL system, the entire wound stator is encapsulated in EPA-SEAL epoxy resin by vacuum-pressure impregnation. In addition, stator and rotor laminations are treated with a special anti-corrosive epoxy coating. All hardware is protected by a corrosion-resistant treatment. Weatherproof conduit boxes are standard. Motors are adaptable to NEMA Type I weather protection. Epa-Seal random-wound motors have run while completely submerged in water for more than 1000 hours, without failure.

Elliott Epa-Seal motors are ideally suited for service in chemical and petrochemical plants, paper mills, rubber mills, in deep mines or coastal service—wherever moisture or corrosive atmospheres demand superior motor insulation.

WRITE FOR **New Bulletin PB 6000-12, giving further details on the remarkable EPA-SEAL insulation system. Crocker-Wheeler Plant, Elliott Company, Jeannette, Pa.**

ELLIOTT Company

CROCKER-WHEELER PLANT • JEANNETTE, PA.

TWO NEW EXCLUSIVES BY

New ¼" Air Cooled SHORTY HEAVY-DUTY DRILL

SMALLEST, MOST COMPACT DRILL ON THE MARKET

New, too! ½" Reversible Special Drill!

Especially designed for telephone pole work, this new B&D tool is perfect wherever confined space or other special conditions call for a drill that backs itself out of the hole it has drilled. Just a flip of the switch and out comes the bit!

Gets into the tightest spots

Here's the drill that goes almost anywhere your hand will go—into tight corners, behind I-beams, into small enclosures. Shorty's offset head gives you finger clearance on flush jobs . . . gives you top control and pressure on every job!

Twin cooling fans keep housing comfortable to handle at all times. Full length paddle switch starts or stops no matter where you grip it. 60% more power. 15% less weight. 32% lower price. Try one soon.

Drilling holes in cramped areas like a switch box is a cinch—with a ¼" Shorty drill.

Wherever your hand will go, your Shorty will drill—even blind behind I-beams!

BLACK & DECKER!

New
MICRO CLUTCH
SCRUGUN®

NO MARRED FINISHES, SCREWHEADS—OR BROKEN BITS

Adjusts to thousandths! Just a simple turn of the barrel gives you micrometer accuracy.

Reversible, too! A flip of the piggy-back switch backs out screws, nuts and bolts fast and easy.

Drives screws to depth set

A simple turn of the wrist sets your B&D Micro Clutch* Scrugun to give you *precisely* the depth you want. Want screws flush? Below the surface? Heads exposed? That's the way you get 'em—every time!

B&D's *exclusive* Micro Clutch lets you set depth in thousandths!(.001) of an inch; stops driving screw when desired depth is reached—automatically! With ordinary care, it won't mar your work, damage screws or break bits. Try one soon.

*Pat. Pend.

50th YEAR

LEADING DISTRIBUTORS EVERYWHERE SELL

Black & Decker®

QUALITY ELECTRIC TOOLS

For more facts Circle 417 on Reader Service Card

See Tools-Electric -Yellow Pages-for Service & Sales

THE BLACK & DECKER MFG. CO., Dept. 0707
Towson 4, Maryland (In Canada: Brockville, Ontario)

☐ Please arrange a demonstration of _____

☐ Please send additional information on _____

Name _____ Title _____

Company _____

Address _____

City _____ Zone _____ State _____

☐ Saws

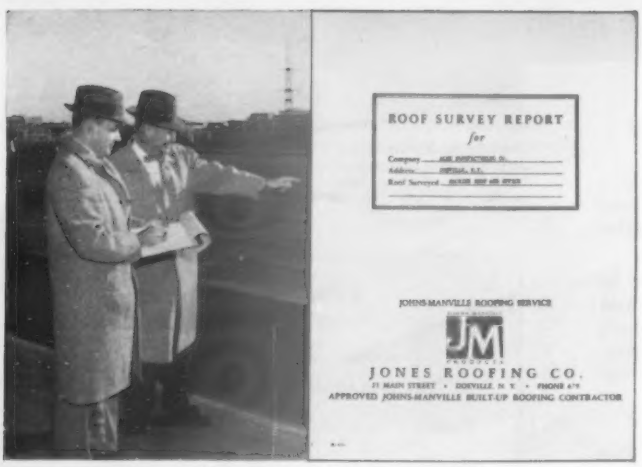
☐ Impact Wrenches

☐ Magnetic Drill Presses

☐ Belt Sanders

Only Johns-Manville offers this survey of your roof by trained eyes

YOUNG ROOFING CO., ST. LOUIS, MO.



Unexpected roof troubles can cost you thousands. That's why it will pay you to ask for an exclusive Johns-Manville Roof Survey now from your approved J-M Roofing Contractor *at no cost or obligation to you.*

He gives your roof a thorough inspection—reports exactly what is needed now and what may be needed later. He shows you how to budget the whole job to avoid heavy expense. And he works with the whole line of Johns-Manville quality roofing products to help your roof keep out of trouble.

For a clear, concise report on *your* roof, see the approved J-M Roofing Contractor listed in the Yellow Pages of your phone book under "Roofers." Or write Johns-Manville, Box 158, Dept. FA-7, 20 E. 40th St., N. Y. 16.

NO OBLIGATION—*and you may save thousands of dollars! Ask your nearest J-M Roofing Contractor for a complete study of your roof. Get all the facts—today!*

JOHNS-MANVILLE

J-M 7★ 7-STAR VALUE PRODUCTS

For more facts Circle 418 on Reader Service Card

For more facts Circle 419 on Reader Service Card

Longer Life! Superior Dependability!

THE ALLEN-BRADLEY LINE of BULLETIN 700 RELAYS IS COMPLETE!

TYPE B general purpose relay shown with 2 N.O. and 2 N.C. contacts. Made with up to 8 poles in various arrangements.

TYPE BX universal relay shown with 4 poles having both N.O. and N.C. contacts. Additional contacts on the 6 and 8 pole relays are N.O. only.

THESE IMPROVEMENTS ARE *IMPORTANT!*

These improved Bulletin 700 Type B and Type BX relays are establishing new standards for relay life and reliability. New design increases mechanical life by *at least 5 times* . . . a new contact motion insures *at least 10 times* greater electrical reliability. Double break, silver contacts never need maintenance, and the new molded coil is impervious to the most severe atmospheric conditions.

These new A-B relays—with their *extra millions of trouble free operations at no increase in price*—are a bargain in the relay field. Write for complete details, today.

NEW ENCLOSURES

for the Bulletin 700 relays are styled by Brooks Stevens—internationally famous industrial designer. Note the "family" resemblance of these enclosures.

NEMA 1

NEMA Type 1 for general purpose applications with wrap-around cover for ready accessibility. It has a "quality" appearance.

NEMA 4

NEMA Type 4 enclosure for applications that require a watertight and weatherproof seal.

NEMA 7

NEMA Type 7 enclosure for NEC Class 1, Group D hazardous gas locations.

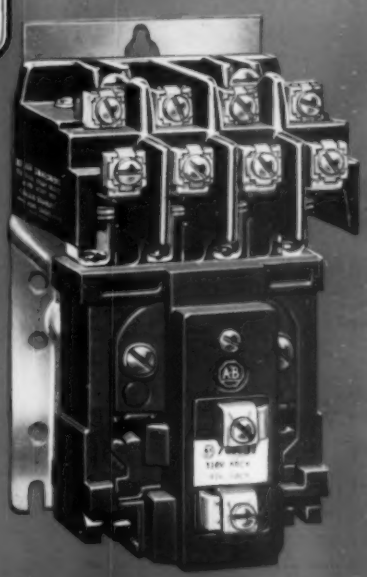
11-60-M

A-B QUALITY

TYPE BR Bulletin 700 convertible contact relay shown with four poles. Made with up to six poles in line.

No other relay offers such simplicity in changing contacts from N.O. to N.C. (or vice versa)—it takes only 60 seconds!

A four pole unit provides any of the contact combinations otherwise available only with five relays of the fixed contact type. You can reduce your relay inventories. In tests, this relay has *proved* it will provide many millions of trouble free operations. Double break, silver contacts never need servicing. Also, each relay can have one or two complete and full rated contacts added to its base—in the field—without increasing space requirements. If you don't know about the Type BR relay, let's get acquainted.



ALLEN-BRADLEY

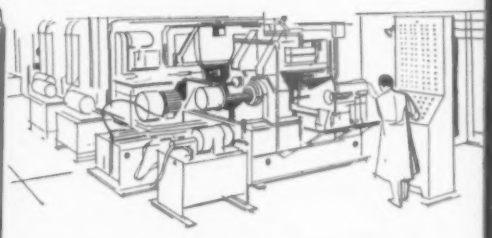
Member of NEMA

QUALITY MOTOR CONTROL

Allen-Bradley Co., 1316 S. Second St., Milwaukee 4, Wis. • In Canada: Allen-Bradley Canada Ltd., Galt, Ontario

AUTOMATION BEGINS HERE

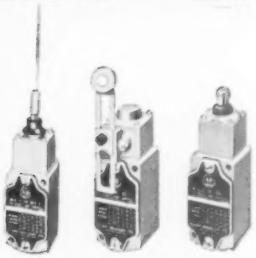
. . . Insist on Allen-Bradley accessories for continuous automatic production



In this broad line of Allen-Bradley accessories, each and every unit carries the traditional A-B trademark of *quality* that stands for trouble free operation. Rugged construction, and maintenance free, silver alloy contacts provide the reliability that is essential to the continuous operation of *your* automatic production machines.

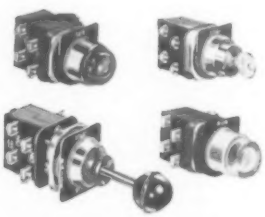
Profit from the experience of the leading machine tool builders . . . insist on Allen-Bradley *quality* motor control *all the way!*

▲ Special push button panels can be assembled to your specifications.

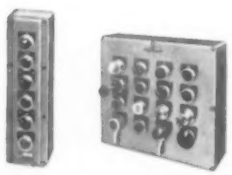


OILTIGHT LIMIT SWITCHES
Bulletin 802T with sealed heads and bodies. Various operators.

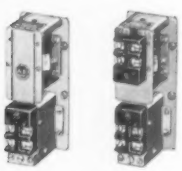
PRECISION LIMIT SWITCH
Bulletin 802 oiltight. Responds to very small operator travel.



OILTIGHT CONTROL UNITS
Bulletin 800T. Choice of push buttons, lights, and switches.



OILTIGHT CONTROL STATIONS
Bulletin 800T for up to 16 units in die cast aluminum enclosure.



PNEUMATIC TIMERS
Bulletin 849. Reliable and accurate. For on-delay or off-delay.

OILTIGHT PRESSURE CONTROL
Bulletin 836. For hydraulic systems with pressures to 5000 psi.

STANDARD DUTY PUSH BUTTONS
Bulletin 800. Up to three units, also pilot lights and switches.

FOOT SWITCH
Bulletin 805. In rugged die cast housing for toughest service.

11-60-M

ALLEN-BRADLEY

Member of NEMA

Allen-Bradley Co., 1316 S. Second St., Milwaukee 4, Wis.
In Canada: Allen-Bradley Canada Ltd., Galt, Ont.

QUALITY MOTOR CONTROL

CAN COLOR CONDITIONING INCREASE YOUR PRODUCTION?

Yes. But let's ask a specialist like Bob Bird. Bob is one of Du Pont's staff of "Color Counsellors"—sales representatives whose years of experience and specific training qualify them to bring you expert, on-the-spot assistance in selecting the right paints in the right colors. Here's his answer:

"There's more to this question of effective maintenance painting than many people realize. Of course, it starts with the selection of top-quality finishes. My customers know their investment in Du Pont paints will pay off in terms of long-lasting protection and good appearance.

"But the job's only half done if you stop there. For maximum return on your maintenance dollar, Du Pont's system of Color Conditioning is a *must*. Tests show conclusively the power of color, scientifically applied, to make employees happier, safer and more productive. Du Pont Color Conditioning lets you harness this power to work profitably for you. By reducing absenteeism, boosting efficiency and promoting safety, Color Conditioning can literally increase your production!"

Bob Bird, or any of his counterparts throughout the country, would be happy to talk with you before you write your next paint specifications. For more information, plus the 28-page booklet, "How to Put Color to Work," write: E. I. du Pont de Nemours & Co. (Inc.), Finishes Division, Dept. F-67, Wilmington 98, Delaware.

* * *

R. H. Bird has developed plenty of problem-solving experience in the field of maintenance painting during more than 20 years with Du Pont's Finishes Division. Enthusiastic about its many possibilities for more efficient maintenance at lower cost, he has developed Color Conditioning programs tailored to meet the needs of a wide variety of schools, hospitals, churches, office buildings and industrial installations. A member of the Construction Specifications Institute, Bob works closely with architects drawing up paint recommendations.

DU PONT COLOR CONDITIONING PAINTS

DU PONT

Reg. U.S. Pat. Off.

BETTER THINGS FOR BETTER LIVING . . . *THROUGH CHEMISTRY*

MODERN MAINTENANCE

IS PROFITABLE MAINTENANCE

R. L. Kirkpatrick, *Manager, Maintenance Sales,* Westinghouse Electric Corporation

Can You Afford to Do Your Own Electrical Repair Work?

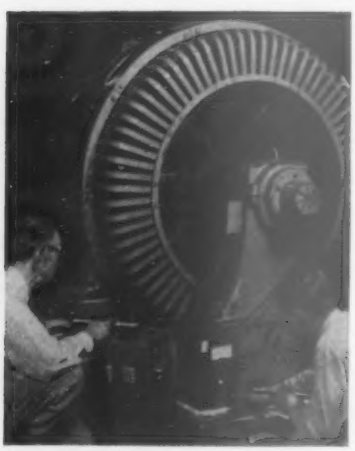
There is a trend for industry to do less and less of its own repair work on production equipment and devote more time to preventive maintenance. There appears to be two major reasons behind this trend: (1) the ever-increasing demand for greater operating reliability of all production equipment, and (2) the high cost of operating in-plant repair facilities.

Maintenance Managers are primarily concerned with increasing the operating reliability of all production equipment to cut down time. The high costs of down time are well known . . . ranging from five dollars to more than one thousand dollars a minute. Maximum reliability can be built into repaired equipment. Modern repair plants are specialists in this field. These plants have the very latest facilities and factory-trained repair technicians. They are thoroughly equipped to handle repairs on all sizes of electrical equipment. Each job is carefully engineered to solve the exact problem that caused the original failure . . . whether electrical, mechanical, or both. Most of these plants guarantee their work. On rewound motors, for example, they provide a one-year guarantee . . . the same as on a new motor. As a matter of fact, when these modern repair plants return your electrical equipment it is often better than when new. They employ the latest

Westinghouse maintenance service

Motor life more than doubled

A pump motor exposed to considerable acid and moisture in a pulp and paper mill had previously required rewinding on an average of three times per year. Westinghouse maintenance service was called on to solve this motor problem. Super COILIFE* epoxy encapsulation was provided as insulation. After nine months, motor is still operating satisfactorily. The same company has since sent two additional motors for rewinding and processing with Super Coilife. *Trade-Mark



Voltage leakage test of large d-c motor in processing plant—one of many tests in the Westinghouse contract plan augmenting the company's preventive maintenance program.

Westinghouse maintenance proves fast, dependable

A 2850-hp induction motor on a river dredge, operating continuously at high overload, recently required fast and highly capable maintenance. The call came to the Westinghouse engineer at 1 A.M. The motor had lost three coils. Despite dense fog, regional cold and confusing levee roads (according to the report), the coils were removed and the motor was back in service the same morning. Arrangements were made to order mechanical parts and Thermalastic®-insulated coils for a complete overhaul, performed by Westinghouse at a later date. The motor now is better than when the customer originally purchased it in 1926.

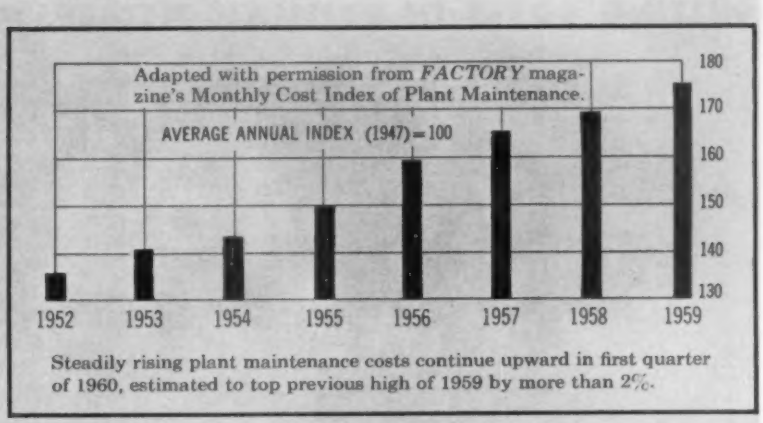
Costly down time eliminated with scheduled inspection

"In-service" failures of large motors operating processing equipment of a large Midwestern company were a serious production problem to Maintenance Management. Westinghouse recommended an annual inspection and testing program to prevent such breakdowns. Field Service Engineers have conducted thorough

developments in materials and techniques. Up-to-the-minute instruments are used to thoroughly test all repaired equipment before it is returned to you. In short, a modern repair plant does everything possible to build maximum operating reliability into your production equipment.

The expert services of a modern repair plant are also available around-the-clock, seven days a week. These specialists are ready to provide service in your plant as well as in their own on a planned or emergency basis. You pay for these services only when you use them. There are no continuing overhead costs to worry about.

This brings us to the second reason for this trend . . . the high cost of operating in-plant repair facilities. In any production process there are bound to be peaks and valleys in the amount of repair work required. This results in disjointed working schedules and expensive overtime. Overhead costs go on regardless of the amount of work being done. There is seldom an even flow of repair work, so that it is virtually impossible to staff the repair shop to meet the varying requirements and emergencies. In addition, major capital expenditures are periodically necessary to keep up to date with testing and repair equipment, materials and the latest techniques.



Steadily rising plant maintenance costs continue upward in first quarter of 1960, estimated to top previous high of 1959 by more than 2%.

By having outside experts handle your repair work you can cut repair costs, improve performance reliability, extend the life of equipment, have more square feet for your own production needs and more people available for production and preventive maintenance work.

Can you afford to do your own electrical repair work?

assures production reliability

mechanical and electrical tests of the machines over the past five years during the annual vacation shutdown periods. Each year they have made recommendations to the company as to the necessary maintenance work to be performed. The contract has completely eliminated large motor down time.

Super Coilife epoxy encapsulation protects the windings of this 10-hp motor from severe acid and moisture conditions which previously caused repeated failure.

In addition to a basic repair service, Westinghouse offers you a score of extra benefits. The repaired equipment will often be better than when new, because Westinghouse actually rebuilds equipment, investigates every opportunity to use up-to-the-minute developments such as exclusive Westinghouse insulations... Thermalastic, Super Coilife, Bondite. At the same time your equipment is being repaired, it can be uprated mechanically and electrically . . . with features of the most recent equipment on the market. Other Westinghouse pluses include complete electrical and mechanical testing equipment, trained specialists for every phase of the job, inventive engineering—difficult to match anywhere.

Westinghouse is providing a comprehensive maintenance and repair service for thousands of plants today and for all types and classes of a broad range of electrical and steam equipment. We invite you to visit any of the 42 Westinghouse modern repair plants. Your Westinghouse representative will be glad to make arrangements for your visit. Take that opportunity to discuss the ways in which Westinghouse can help you prepare a modern maintenance program that will save you money . . . no matter what your in-plant costs are today!

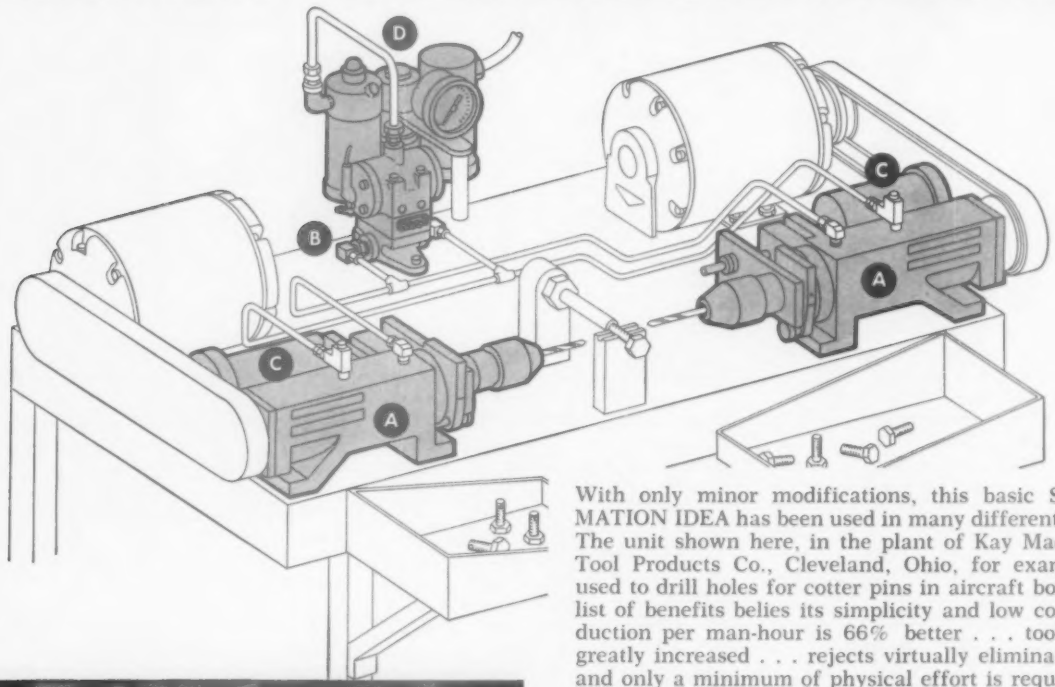
J-95214

YOU CAN BE SURE...IF IT'S

Westinghouse

TUNE IN WESTINGHOUSE-CBS TV-RADIO COVERAGE PRESIDENTIAL CONVENTIONS, JULY 10-29

YOUR OWN MEN CAN BUILD THIS PRECISION MACHINE FOR CUTTING COSTS IN DRILLING METALS, PLASTICS AND WOOD



As shown in the photo above and "heyed" in the drawing, this shop-built drilling machine consists essentially of two low-cost, air-operated Bellows-Locke Model 22A Drill Units (A), a Bellows Electroaire® operating control valve (B), two Bellows Hydro-Checks® which provide smooth precision operation (C) and a Bellows Lubri-Air® Control Unit which cleans, regulates and lubricates the air supply (D). Not visible is the foot-operated control pedal.

697C-3

With only minor modifications, this basic SPOT-A-MATION IDEA has been used in many different plants. The unit shown here, in the plant of Kay Machine & Tool Products Co., Cleveland, Ohio, for example, is used to drill holes for cotter pins in aircraft bolts. The list of benefits belies its simplicity and low cost: production per man-hour is 66% better . . . tool life is greatly increased . . . rejects virtually eliminated . . . and only a minimum of physical effort is required for what formerly was a very fatiguing operation.

The machine is built around two compact interlocked Bellows-Locke Model 22A Drill Units — air operated, hydraulically controlled — mounted horizontally in opposed positions. Automatic feeding, positioning and ejection could be incorporated easily by the addition of other Bellows "Controlled-Air-Power" Devices. This SPOT-A-MATION IDEA can be readily adapted to perform a wide range of other operations, such as punching, forming, riveting, crimping, etc., by using such other Bellows work units as The Bellows Air Motor® in place of the Drill units.

This machine is typical of the ways cost-conscious men the world over are using Bellows "Controlled-Air-Power" Devices to secure faster, better, lower-cost production. Opportunities exist in your plant, too. Why not investigate — *today!*

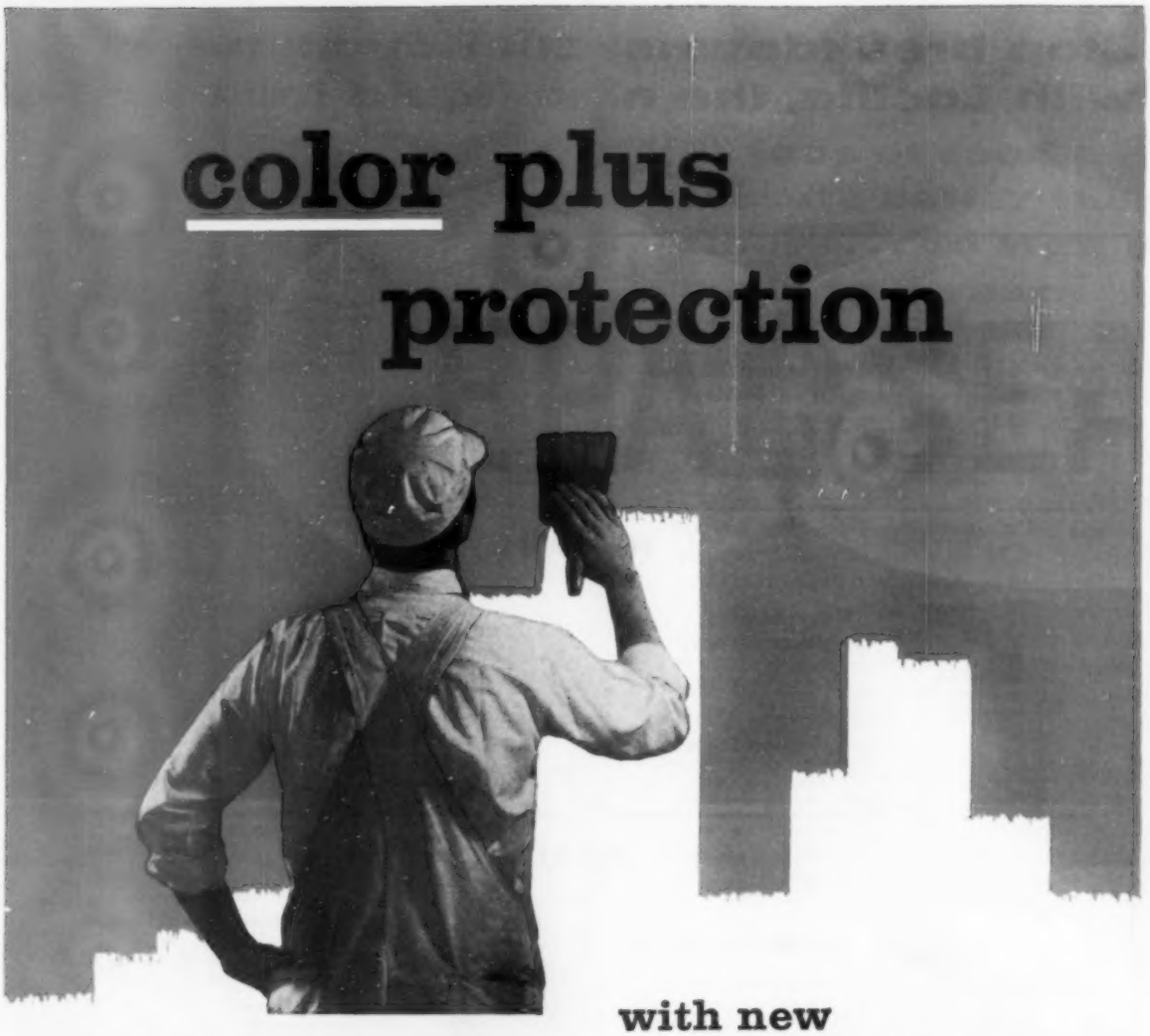
THIS "SPOT-A-MATION IDEA" FILE IS YOURS ON REQUEST

Contains installation data, wiring diagrams and equipment lists for the "Spot-A-Mation" idea sketched above, as well as for scores of similar ideas you can use. Write Dept. FA-760, Bellows-Valvair, Akron 9, Ohio.

Bellows-Valvair

The Bellows Co. • Valvair Corp. *Akron 9, Ohio*

DIVISIONS OF INTERNATIONAL BASIC ECONOMY CORPORATION (IBEC)



Good looks and good maintenance go on together with a coat of the new colored aluminum paints and roof coatings. Industrial buildings and installations can actually be *decorated* for *protection*.

Attractive colored aluminum paints provide heat reflectivity and insulation benefits. In addition, they protect metal and other surfaces from corrosion, rust and weathering. They're easy to apply by brush, roller or spray gun. Ideal for interior or exterior use, for roofing or equipment, for coding pipe or beautifying and protecting buildings.

Although Reynolds does not make paint, it does supply the finest quality aluminum pigment to leading manufacturers of colored aluminum paints and coatings. For names of manufacturers write *Reynolds Metals Company, Box 2346-PJ, Richmond 18, Virginia.*

with new colored aluminum paints made with

REYNOLDS ALUMINUM PIGMENT

The Finest Paints Made with Aluminum are made with REYNOLDS ALUMINUM PIGMENT

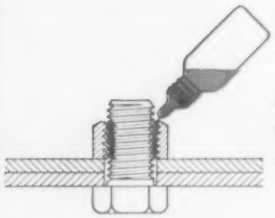
Watch Reynolds TV Shows: "Bourbon Street Beat" and "Adventures in Paradise"; and, resuming in October, "All Star Golf"—ABC-TV

For more facts Circle 423 on Reader Service Card

Stop breakdowns, cut downtime with Loctite, the new liquid lock

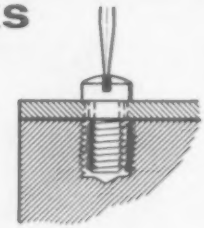
Loctite Sealant stops costly breakdowns due to nuts that work loose . . . repairs loose bearings without expensive shaft or housing preparation . . . seals pipe and tubing joints pressure tight.

LOCKS



Makes any threaded part self-locking

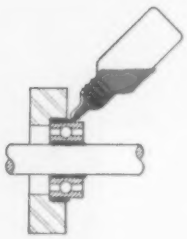
- prevents breakdowns caused by loose bolts, nuts and studs



Simplifies servicing

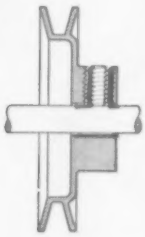
- makes any threaded part vibration-proof yet easy to disassemble with ordinary tools

RETAINS



Makes bearing replacement easy

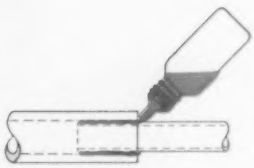
- retains bearings without press fit
- eliminates reboring, sleeves, shims, and weld metal builds



Acts as liquid shim

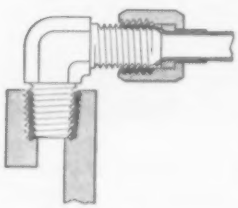
- corrects fitting of a part on a shaft by filling clearance where slippage occurs. Also locks set screws
- can be used to retain pulleys, gears, rollers, drums, hardened sleeves, oil seals

SEALS



Simplifies tube joining

- replaces solder
- requires no heat or corrosive fluxes
- no mixing . . . comes ready to use



Prevents leaks in high-pressure fluid lines

- completely fills joints with tough plastic
- resists heat, cold, fuels, oil, water, solvents, all hydraulic fluids
- contains no solid particles to foul valves

LOCTITE Sealant simplifies repairs ... minimizes inventory problems

A single drop of Loctite makes any nut a lock nut—any screw a lock screw. Each drop a "Liquid Lock Washer" that fits all sizes. A free-flowing liquid plastic, it wicks into threaded parts and close-fitting metal joints . . . then hardens from the inside out.

Easy-to-apply Loctite comes ready for use. It requires no heating or mixing . . . will not air-dry . . . and stores for years. There are Loctite service kits for all types of maintenance applications.

You can count on your distributor salesman for service that keeps things running. Ask him for information on how to use Loctite to perform maintenance magic.

LOCTITE® SEALANT

BE PREPARED FOR QUICK REPAIRS

ORDER MAINTENANCE KIT NO. 2-50 TODAY

Contains two squeeze bottles of cost-saving Loctite Sealant; applicator nozzles; treats 6000 ¼" nuts; Locquic Cleaner for use on greasy or oily parts (jar has dip basket for small parts); complete directions. Price . . . only $15.95.

American Sealants Company • 391 Woodbine St., Hartford 6, Conn

For more facts Circle 424 on Reader Service Card

For more facts Circle 425 on Reader Service Card ➤

Nothing takes a bigger beating than your floors . . .

2½ tons of food a minute batter these floors . . . no sign of wear in 5 years

Associated Grocery, Inc., Dallas, took no chances. They installed the best . . . MASTERPLATE "iron-armoured" floors—for only pennies per square foot more.

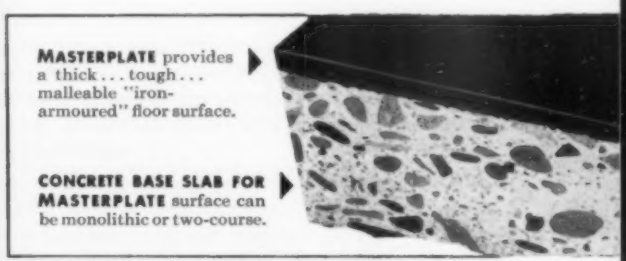
Some 300 conveyor trucks, 8 fork lifts and 22 "tuggers"—handling over 2,400,000 pounds of foodstuffs a day—grind away without any sign of floor wear. And because malleable MASTERPLATE floors don't shatter and dust—goods go out *clean*.

Associated found real economy in MASTERPLATE floors, and that's not all. They can count on MASTERPLATE to deliver from four to eight times longer wear than the best plain concrete floor . . . no costly repairs or replacement because MASTERPLATE floors are tough enough to take it.

Before *you* install or replace another floor, call in the local Master Builders field man for full information on this unique "floor package"—a *superior product*—MASTERPLATE . . . plus *on-the-job* service by a skilled Master Builders field man.

The Master Builders Company
Division of American-Marietta Co.
Cleveland, Ohio
World-wide manufacturing and service facilities

TRACER LIGHTS show heavy traffic flow pattern along "towveyor" line and on truck-loading dock at Associated Grocery, Inc., Dallas, Texas • Douglas Simril, General Manager • Consulting Engineers: Mullen and Powell • Contractor: Carpenter Bros. • Floor Contractor: Mobley and Speed—all of Dallas, Texas.


MASTERPLATE provides a thick . . . tough . . . malleable "iron-armoured" floor surface.
CONCRETE BASE SLAB FOR MASTERPLATE surface can be monolithic or two-course.

FOR FINISHING NEW CONCRETE FLOORS or re-surfacing old concrete floors—MASTERPLATE withstands impact and abrasion . . . is oil resistant and virtually non-absorbent . . . easy to clean . . . non-dusting . . . resistant to many industrial corrosives and strong cleansers . . . *and outwears the best plain concrete floor 4 to 8 times*, according to tests by top independent testing authorities.

Our 50th Year

MASTER BUILDERS®
MASTERPLATE*

MP-3008

*MASTERPLATE *is a registered trademark of The Master Builders Co. for its specially prepared, metallic aggregate for producing "iron-armoured" concrete floors.*

5 Reasons why it pays to buy from Ryerson

MOST DIVERSIFIED STOCKS—Ryerson inventories include by far the widest range of types, shapes and sizes available anywhere.

FAST SERVICE—A combination of varied stocks, modern equipment and an experienced staff means stepped-up processing for *regular requirements* and unparalleled ability to meet the most urgent *emergency needs.*

HIGHEST QUALITY—New quality-control standards, completely detailed and published, govern every aspect of Ryerson specifications and operations. Here is steel that's *certified* for dependable performance, and cut to your most *exacting* requirements.

TECHNICAL HELP—Experienced specialists, well qualified to work with you on problems of replacement and selection, help you achieve optimum value for your steel-buying dollar.

INTEGRITY—The nationally recognized leader in its field, Ryerson values your patronage much too highly to sacrifice your long-term good will for any immediate gain. 117 years of fair dealing—at your service.

LET RYERSON CARRY YOUR INVENTORY—Whatever your maintenance steel needs, you get one-call, one-order delivery at Ryerson. Order today.

METALOGICS
RYERSON PLUS VALUES

STEEL • ALUMINUM • PLASTICS • METALWORKING MACHINERY

RYERSON STEEL®

Joseph T. Ryerson & Son, Inc., Member of the INLAND® Steel Family

PLANT SERVICE CENTERS: BOSTON • BUFFALO • CHARLOTTE • CHICAGO • CINCINNATI • CLEVELAND • DALLAS • DETROIT • HOUSTON • INDIANAPOLIS
LOS ANGELES • MILWAUKEE • NEW YORK • PHILADELPHIA • PITTSBURGH • ST. LOUIS • SAN FRANCISCO • SEATTLE • SPOKANE • WALLINGFORD

For more facts Circle 426 on Reader Service Card

FACTORY PRESS TIME REPORT • JULY 1960

Looking Ahead in Business

The business outlook for the remainder of 1960 remains good—though you may begin to hear claims to the contrary as the pressures of the upcoming political campaign increase. To ward off confusion in the months ahead, chalk up these facts: Business so far this year hasn't measured up to expectations. Nevertheless, 1960 has been a record business year. More important—the recession that's been talked about since the beginning of the year is still not in sight.

•

One reason for continued confidence about the business outlook is that chances for a pick-up in consumer spending continue to improve. There have been repeated indications this year that consumers are in a spending mood. And within recent weeks incomes have been growing sufficiently to permit a step-up in buying. For example, during May personal income again moved higher.

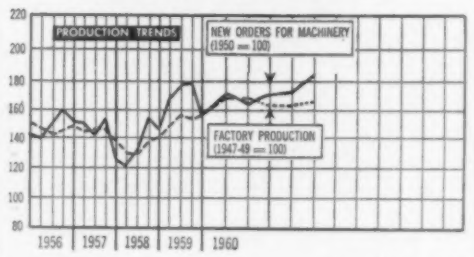
A good part of the latest increase in income comes as a result of gains in earnings of factory workers. This indicates that manufacturers generally are enjoying growing business.

This growing business has also shown up in production figures. The Federal Reserve Board reports industrial output expanded sufficiently during May to send the index of industrial production up to 110 (1957 = 100). This is a gain of only one point over the previous month, but it's still the first increase since January.

Consumer buying is also likely to rise in response to recent moves by the Federal Reserve Board to ease credit. As a result of Fed actions in recent weeks, consumers (and businessmen, too) should soon find loans from commercial banks more readily available—and less costly.

Moreover, these moves to easier credit by the Fed have been accompanied by liberalization of requirements for FHA and VA-backed mortgage loans. Chances for a second-half upturn in home building are thus even better than before. And with this upturn sales of appliances and other home furnishings are also likely to improve. In general, then, consumer spending shapes up as an important element of business growth in the months ahead.

FACTORY FIGURES OF THE MONTH



Indicator	MAY[p] 1960	APR.[r] 1960	MAY 1959
New Orders for Machinery (exc. elec.)[1]	186.0	173.0	187.0
Contracts for Industrial Construction[2]	141.0	137.0	114.0
Factory Production[3]	166.0	164.0	165.0
Consumers' Prices (cost of living)[4]	126.3	126.2	124.0
Industrial Prices (materials, supplies)[4]	128.2	128.7	128.4
Manufacturing Employment (millions)[4]	16.4	16.4	16.4
Total Employment (millions)[5]	67.2	66.2	66.0
Unemployment (millions)[5]	3.5	3.7	3.4

[p] = preliminary [r] = revised

Sources: 1. McGraw-Hill Department of Economics (1950 = 100); 2. Engineering News-Record (1950 = 100); 3. U. S. Federal Reserve Board (1947-49 = 100); 4. U. S. Department of Labor, Bureau of Labor Statistics (1947-49 = 100); 5. U. S. Department of Labor, Bureau of Labor Statistics.

And there is new evidence confirming earlier indications that capital spending will be the key force in business growth this year. The latest U. S. Department of Commerce quarterly survey of capital spending schedules shows that outlays for plant and equipment in the months ahead will be high and will continue to rise modestly.

•

In spite of this favorable business picture, politicians can't go into the coming campaign free from major worries.

Internationally, tensions clearly have mounted in recent weeks. Defense is thus likely to become a more important campaign issue.

Domestically, politicians of both parties must face the fact that unemployment is high despite generally good business. Both these issues are likely to elicit increased federal spending—spending that will give business an added boost.

FACTORY PROBLEM-SOLVING GUIDE • JULY 1960

67 Good Leads to File

THIS FILING SYSTEM is designed to give quick access to past FACTORY articles that can help you solve your current operating problems. Here's how it works:

1. All major articles (set here in bold type) and many short items are classified according to a functional code.
2. Certain articles are also coded (see numbers in parentheses) to show secondary or closely related topics.
3. To use, cut up the items below. Paste them on 3x5-in. cards, file by code number. To cross-index, copy information on a second card, file by secondary code.

For ways to use your Guide, write Reader Service, FACTORY, 330 W. 42nd St., New York 36.

1.0–1.4 Plant Maintenance and Engineering

MANAGEMENT AND PRACTICES (1.1)

1.10 Manual with a maintenance message (July '60) p. 206
1.104 Critical path scheduling (July '60) p. 74 (1.105)
1.113 Mobile pump rig tests valves (July '60) p. 162

BUILDINGS AND YARDS (1.2)

1.204 Bright buckets bury butts (July '60) p. 168 (1.309)
1.207 The missing link in plant design (July '60) p. 94
1.209 Small town digs deep (July '60) p. 160
1.210 Spot-checking autos (July '60) p. 159
1.210 Key hazards plant guards can spot (July '60) p. 162

SERVICES AND FACILITIES (1.3)

1.309 Cleaning by suction (July '60) p. 170

ELECTRICAL SERVICES (1.4)

1.401 The truth about industrial TV (July '60) p. 78
1.401 Dial direct for fast calls (July '60) p. 158
1.411 More light, less glare (July '60) p. 159

2.0–2.4 Production

ORGANIZATION AND MANAGEMENT (2.1)

2.101 Assembly-line speed for job shops (July '60) p. 70
2.102 Solid '60 life for a gay '90s plant (July '60) p. 102

PRODUCTION CONTROLS AND SYSTEMS (2.2)

2.203 Noise reduction works in reverse (July '60) p. 160
2.203 Test spots poor insulation (July '60) p. 162
2.204 Profit control for plant inventory (July '60) p. 90
2.204 Puts everything in its place (July '60) p. 167 (2.409)

METHODS AND TECHNOLOGY (2.3)

2.302 No bouncing from job to job (July '60) p. 164
2.302 Plant devices are on the beam (July '60) p. 169
2.303 Solving job-shop problems (July '60) p. 157
2.303 3-in-1 machine chops costs (July '60) p. 163
2.303 Removing burrs fast (July '60) p. 170
2.304 Steel casing doubles as template (July '60) p. 167
2.308 Putting finger on drilling (July '60) p. 164 (2.309)
2.310 Adjustable drive peps up buffing (July '60) p. 156
2.310 Machine is its own housekeeper (July '60) p. 156
2.313 Cleaning by sound (July '60) p. 159
2.314 Magnetic rollers support production (July '60) p. 159
2.314 Steel sheets snub one another (July '60) p. 163
2.314 Giant press has 7000-ton grip (July '60) p. 166
2.316 Painting—E & T Report No. 6 (July '60) p. 95
2.320 Quenching drowns heat hazard (July '60) p. 168
2.321 Mechanical tricks boost output (July '60) p. 161

MATERIAL HANDLING, LAYOUT (2.4)

2.401 Collapsible bags collapse costs (July '60) p. 158
2.402 Coffee cups roll to windows (July '60) p. 165
2.404 Picks up coils fast but gently (July '60) p. 160
2.404 Three ways to efficiency (July '60) p. 165
2.404 Handling odd shapes (July '60) p. 166
2.404 One-time handling (July '60) p. 170 (2.408)
2.405 Fast wrapper speeds bundling (July '60) p. 166
2.405 Streamlined package (July '60) p. 168
2.409 New language for pallet-rack users (July '60) p. 84
2.409 Pushbutton storage has memory (July '60) p. 158
2.409 Stretching space with side loading (July '60) p. 158
2.409 Pegboard cabinet (July '60) p. 163
2.410 Fuel cells to replace batteries? (July '60) p. 170

3.0–3.4 Plant Management

PERSONNEL DEVELOPMENT (3.2)

3.201 Retraining displaced employees (July '60) p. 86
3.202 Rotate jobs to develop men (July '60) p. 200
3.202 Snaring the college grad (July '60) p. 203
3.204 Anatomy of a big wheel (July '60) p. 198
3.204 Executives or yes men? (July '60) p. 198
3.205 Seeing daddy work (July '60) p. 164
3.205 Depression aftermath (July '60) p. 198
3.205 Are executives on the way out? (July '60) p. 198
3.205 Shunning human booby traps (July '60) p. 200

EMPLOYEE RELATIONS (3.3)

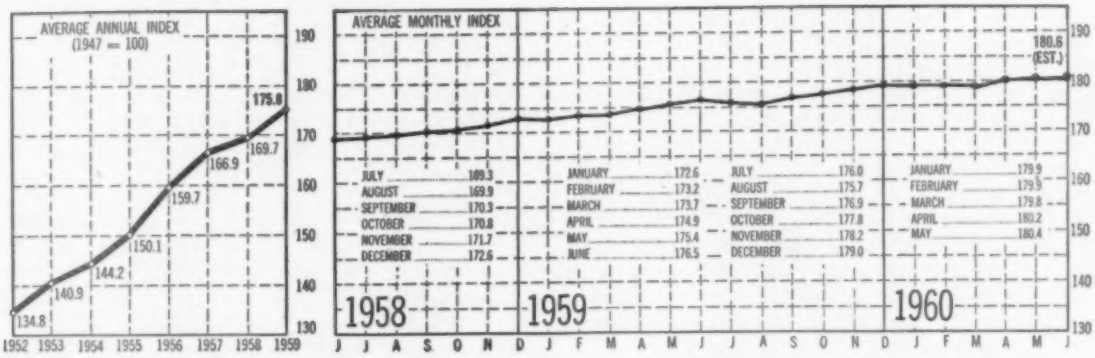
3.303 Engineers look for green stuff (July '60) p. 200
3.303 I'm late! So who cares? (July '60) p. 203
3.305 Blue-collar workers get their say (July '60) p. 164
3.306 65 years in plant feeding (July '60) p. 162
3.310 Humans are rust-prone (July '60) p. 160
3.312 Consulting on safety (July '60) p. 156 (3.314)
3.312 Glow shouts safety (July '60) p. 160
3.314 The Summit that never was (July '60) p. 67

LABOR COSTS (3.4)

3.403 Indirect wages rise in 9 more cities (July '60) p. 93
3.403 Moving expenses are plant's headache (July '60) p. 168
3.405 Youth takes a back seat (July '60) p. 198

FACTORY PRESS TIME REPORT • JULY 1960

Cost Index of Plant Maintenance



Index rises slightly

Move up is due almost entirely to rise in carpenters' wages and tool costs.

Due almost entirely to a big increase in carpenters' wages and a solid jump in the price of cutting tools, FACTORY's Cost Index of Plant Maintenance edged upward 0.2 of a point in May to a level of 180.4.

Aside from the carpenters and cutting tools, however, general labor costs and materials prices were down a fraction of a point.

So far this year, the Cost Index has climbed only half a point from its January level. During the same period last year the rise was 2.8 points.

The outlook for the remainder of 1960 calls for only slight rises each month. Labor costs are almost sure to go higher this year, though the rate will be more moderately paced than in the past. The story on materials is a bit brighter—it looks as though costs in that area will have real difficulty edging higher than a few fractions during the next six months or so.

Returning to the current Index, it's significant to note that materials costs in the buildings and facilities classification, by falling 0.1 of a point, are paralleling the course of wholesale prices in the general economy (that is, down 0.5 of a point in May). For example, the price index for valves and fittings dropped by 1.2 points, while that for non-ferrous alloys declined 0.8 of a point. Prices in the equipment section were the only figures to show an increase in the materials index.

By the same token, in the labor cost index the buildings and facilities classification was the only figure to go up in May.

	AVERAGE 1959	MAY (Preliminary)	APRIL (Revised)
Building and Facilities Index	166.5	171.1	170.6
Materials	142.3	141.1	141.2
Brick	152.5	155.0	154.3
Elec. fixtures	129.0	132.4	132.4
Elec. switches, boards, fuses	185.6	184.1	184.3
Elec. wire, copper	138.9	148.6	148.6
Glass	152.0	152.0	152.0
Gutters, spouts, ducts	178.0	180.2	180.2
Gypsum products	140.8	140.9	140.8
Heating equipment	127.7	126.2	126.2
Lumber	134.5	132.2	132.8
Millwork	155.7	156.9	156.8
Paint	130.1	130.1	130.1
Pipe, cast iron	170.4	170.4	170.4
Pipe, steel	190.9	192.6	192.6
Pipe & tubing, copper	154.1	161.0	161.0
Roofing	123.7	113.3	113.3
Sanitary fixtures	155.6	162.3	161.4
Sash, metal frame trim	140.9	136.8	137.7
Solder	124.1	120.6	120.5
Steel, structural	236.3	236.3	236.3
Tanks, steel	138.0	140.2	140.2
Valves & fittings	166.7	171.3	172.5
Wire mesh	162.6	162.9	162.9
Labor	182.6	191.1	190.2
Carpenters	168.9	177.7	174.9
Electricians	191.1	199.6	199.6
Painters	187.9	196.0	196.0
Equipment Index	179.5	184.4	184.3
Materials	176.1	178.1	177.9
Abrasives	161.0	157.9	157.9
Alloys, non-ferrous	125.4	121.1	121.9
Bars & plate, steel	227.1	227.2	227.2
Bearings	164.1	164.6	164.6
Belting	157.3	159.3	159.3
Bolts, nuts & screws	225.6	223.8	223.8
Chain	184.0	184.0	184.0
Controls (electrical)	185.6	184.1	184.3
Gear-reduction units	181.7	181.7	181.7
Hand tools, mechanics	198.2	203.4	203.6
Lubricants	124.1	125.7	125.7
Motors	147.3	148.3	148.2
Non-ferrous metals	129.0	136.6	136.6
Precision tools	156.6	158.2	158.2
Pumps	194.8	196.1	196.1
Tools, cutting	172.4	187.6	183.0
Valves & fittings	166.7	171.3	172.5
Labor	181.8	188.6	188.6
All mfg. labor	179.9	184.4	184.4
Machine tool labor	184.2	192.7	192.7
FACTORY'S COST INDEX	175.8	180.4	180.2

FACTORY PRESS TIME REPORT • JULY 1960

Looking Ahead in Labor

Look carefully at the 1960 collective bargaining trends. The results can be deceiving.

Some "cheap" wage settlements are showing up in important industries. In others, big unions are asking modest pay advances. Railroad settlements are at five cents an hour. Some aircraft contracts provide no wage increase for 1960. In major electrical industry negotiations, unions are asking the same pay raise they've collected for the past two years.

The fringes have taken over the biggest part of the contract settlements. And the biggest fringe is now job security. This means union negotiations in mid-1960 have finally completed a flip-flop. The trend-setters have now swung over to "iceberg" settlements—where the hidden costs are greater.

Severance pay, temporary layoff benefits, relocation jobs, and other job protection devices have become the number one bargaining issue.

Union negotiators' concern over jobs isn't new. It broke out first in auto-industry bargaining in 1955 with the showdown over the guaranteed annual wage. And it advanced through steel and other industries with the supplementary unemployment benefits contract clause.

As automation has gained, labor leaders' worries over jobs have increased to the point where wage increases now take a back seat.

With an eye to the future, James B. Carey's International Union of Electrical Workers (IUE) has asked for a joint industry-labor automation study and talks about the big bargaining issue of tomorrow—the shorter work week.

In current electrical industry negotiations between General Electric Company and the IUE, the IUE's job-saving demands far exceed its wage request of 3.5%. A sub-plan for laid-off workers alone would cost 3%. The union asks severance pay for laid-off workers, and also first crack at jobs in relocated factories. Another demand would prohibit the industry from subcontracting work at plants where IUE members are temporarily out of work.

Unions and employers are fighting each other—harder than ever. The latest National Labor Relations Board figures reveal an astounding 25% jump in the cases it handled in fiscal 1959.

A record-breaking 12,000 charges of unfair labor practices came before the NLRB—a majority of these from individual workers rather than from management or union officials. A breakdown shows:

- Illegal discrimination involving union membership is the most common charge against employers.
- Refusal to bargain with unions in good faith is the second most typical unfair labor practice charge against management.
- Illegal restraint or correction of employees and discrimination against non-union employees were the most common charges against unions.
- Complaints of secondary boycott activities and refusal to bargain ranked next in the charges brought against unions.

But labor relations experts believe labor and management now have a broader understanding of the Taft-Hartley Act—and how to use it. The NLRB survey runs through June 1959 and, despite its sizable case load, does not reflect the Taft-Hartley Act changes in the Landrum-Griffin reform law.

The Landrum-Griffin law alone is expected to add substantially to the five-man Board's work day as it interprets new secondary boycott, picketing, and other T-H rules. The Board gives no official reason for last year's stepped-up activity.

But, says NLRB General Counsel Stuart Rothman, unions and employers can help themselves by using the Board's voluntary settlement methods. The caseload totals—with the threat of new records to come—has NLRB officials working overtime on how to handle them. General Counsel Rothman—who processes all unfair labor practice cases—reports a speed-up in case handling through staff training programs, new manpower, and "just plain hard work."

Once a Board examiner finds an unfair labor charge has merit, he can help the parties to settle the issue in conference though he cannot mediate their dispute or require them to reach an agreement.

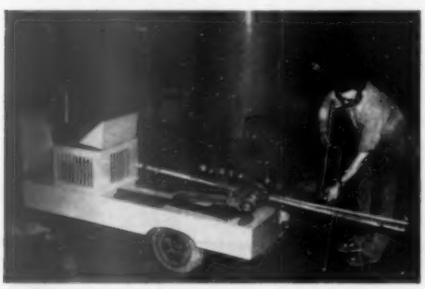
SEE LABOR RELATIONS NEWS, PAGE 182

NEW MAINTENANCE IDEAS

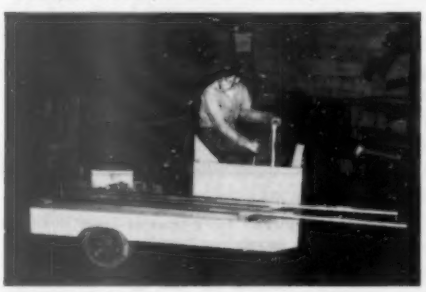
Here is the proven practical way to *motorize* maintenance departments

ELECTRICAL — This 18 sq. ft. of deck area carries the man, the material, and the equipment in one operation.

PLANT ENGINEERING — Heavy loads of odd sizes and shapes fit on platform with room for tools to do the job on arrival.



PIPE FITTER — Speed and maneuverability engineered for maintenance functions on widely scattered jobs inside plants and outside yards.



MILLWRIGHT — Ample load capacity for carrying heavy replacement parts such as long heavy shear blades.

Industries switch to labor-saving PRIME-MOVER F-10 and step up maintenance efficiency three ways:

1. Doubles or triples maintenance man's productivity by *transporting* him to the job . . . The most obvious waste of a workman's time is having him walk to widely scattered jobs. An F-10 gets him there at the top speed permissible under normal plant conditions!
2. Lets him carry the needed materials with him . . . The man doesn't have to depend on someone else to bring materials which ties up other equipment. An F-10 hauls pipe, lumber, fixtures, motors, or odd shaped materials!
3. Moves the *workman* and the *equipment* in *one operation* . . . Almost every maintenance job requires tools and equipment to do the job. An F-10 carries hand tools, power tools, ladders, welding equipment, or special tools.

*An F-10 is an industrial truck built for dependable service in industry — and sold by industrial truck distributors. Write today for job data on how this truck, which lists for only $996.00 F.O.B. factory, can be one of the best investments your plant has ever made.

PRIME-MOVER CO., Muscatine, Iowa

Gentlemen: Please send me job data on how PRIME-MOVER F-10 performs for maintenance departments that handle these services:

☐ Electrical ☐ Carpentry ☐ Painting
☐ Pipe Fitting ☐ Millwright ☐ General

YOUR NAME_____

FIRM NAME_____

ADDRESS_____

CITY_____ STATE_____

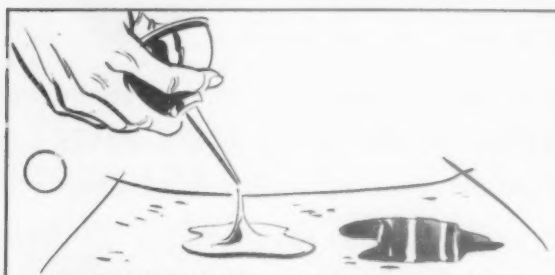
DISTRIBUTOR DAN, the SKF bearing man, offers

FIVE TIPS ON BEARING LUBRICATION

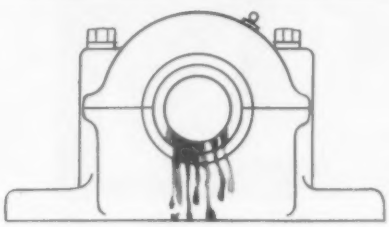
—that can save time and trouble for you

WHEN TO RE-LUBRICATE? Always follow the manufacturer's directions, if they're available. Most bearings, whether oil- or grease-lubricated, need cleaning and re-lubrication once a year. Re-lubricate oftener if the bearing is large, operates at high speeds or temperatures of 120-140 F. or higher.

WHAT GREASE CAN TELL YOU. Grease itself can tell you when cleaning and re-lubrication are needed. Dark grease means that oxidation has started or that abraded particles are present. Changes in the original color indicate water. Grease of a hard consistency should always be replaced.



WHEN TO CHANGE OIL. Compare the oil in the bearing with unused oil. Clouded oil indicates water. Dark oil frequently indicates sediment. Dark, pitch-like coatings on the rings, roller ends or cage mean the oil has become dirty or begun to carbonize. So, clean the bearing and housing and re-lubricate.



TOO MUCH IS WORSE THAN TOO LITTLE. Don't overlubricate. Only grease that actually contacts the bearing lubricates. Using too much grease may cause churning and lead to overheating and loss of lubricant. Remember: the higher the speed, the more sensitive a bearing becomes to excessive lubrication.

CLEANLINESS, FIRST AND LAST. Clean new oils and greases will usually force-out old lubricants in the bearings. But they won't if the lubricant is badly oxidized. Pour a hot aqueous emulsion into the housing. Rotate shaft until bearing is clean. Drain solution while rotating shaft. Then, flush with hot light oil, drain and add new lubricant.

Baffled by a bearing problem? Whether it's selection, mounting, or maintenance—consult your Authorized SKF Distributor. He's staffed to help you keep them running smoothly and he stocks all the bearing types and sizes you need.

SKF

AUTHORIZED DISTRIBUTOR

6019

Spherical, Cylindrical, Ball, "Tyson" Tapered and REED Miniature Bearings

EVERY TYPE—EVERY USE

SKF®

SKF INDUSTRIES, INC., PHILADELPHIA 32, PA.

*REG. U. S. PAT. OFF.

For more facts Circle 428 on Reader Service Card

BANNOW . . . went along for the ride

MITCHELL and MEANY . . . arranged the tour

But without the right signals . . .

The Summit never really got started

It was an open secret, when the first labor-management "summit" conference got under way in May, that management was taking part only because President Eisenhower had urged it to do so. The National Association of Manufacturers—which picked the industry representatives—publicly expressed its lack of enthusiasm. Employers had tried such meetings before and the failures evoked clearer memories than the reasons for having them.

But the White House said "meet," so they did.

Union officials felt differently. They wanted to talk and had their own ideas on how it should be done. This was the atmosphere for the first conference.

They got almost nowhere. Instead of laying out an agenda for subsequent meetings, there was disagreement on who should attend them. The big three of labor—George Meany (AFL-CIO), Walter Reuther (UAW), and George Harrison (Railway Clerks)—complained that their opposites here were not the big three of management.

By Alan E. Adams, Washington Bureau

They wanted leaders of major industries. The management men present were NAM President Rudolph Bannow (left photo) and three company presidents: William J. Grede of J. I. Case Company, farm equipment manufacturer; L. A. Peterson of Otis Elevator Company; and Robert W. Stoddard of Wyman-Gordon Company, industrial manufacturers.

Meany, Reuther, and Harrison stated they could speak for organized labor. They asked for employers who could speak for management. On that note, the session adjourned.

They were publicly friendly, but all agreed no pictures were to be taken of the participants together.

If the second session of the labor-management summit conference comes off on schedule—loose as that is—it should take place this month.

It would be easy to write off the chances for a successful conference, or series of conferences, at the outset. The roadblocks are hard to see over. The union and employer teams meeting in the first session accomplished nothing.

One big factor lacking is a sense of urgency—which was present in other summit conferences that failed despite it. Once the steel strike was over, Congressional concern for a new method of seeking labor-management peace petered out.

In the steel strike, prospects of government intervention or compulsory arbitration were just around the corner. Labor *and* management came close to losing their voluntary system of collective bargaining.

Turn the page

EDITORIAL

NEEDED: Management Statesmanship

By the time you read this editorial, a few hand-picked management and labor leaders will probably have made their second trip to Secretary Mitchell's "summit." Chances for their finding common grounds of agreement are slight. And, sad to state, the main deterrent is the lack of statesmanlike leadership in the management camp.

The "summit" objectives—Mr. Mitchell states them clearly in his interview with FACTORY—are simple. Vital problems face both management and labor in the 1960s: Inflation, foreign competition, productivity, automation. Leaders on both sides of the fence must find solutions other than the picket line and the shut-down factory —or public pressure will force government to step in.

In FACTORY's opinion, management's approach to these meetings has been less than inspired. Short-sighted judgment—and perhaps painful experience—has led the National Association of Manufacturers team to assume an attitude that is both cynical and churlish. The public interest at this time calls for mutual understanding and better communications. Our guess is that the current management attitude will not only defeat this purpose but will also play into the hands of the labor leaders.

Management's reluctance to enter marathon debates with professional labor spokesmen is understandable. The labor movement is badly in need of rallying issues. It could benefit from a better social acceptance. The summit talks might provide a hoped-for platform from which to sound off—a talent not found wanting among Meany, Reuther, & Company. And, historically, the unions have taken advantage of national crises to chip away management's control of its employees. The discouraging experience of World War II's Labor-Management Committees, which eroded so many of management's prerogatives, is a notable case in point. So it's only natural for management to approach these summit meetings with its guard up.

What is needed from management now—and we can think of nobody more aptly suited to furnish it than the NAM—is resourceful, responsible leadership. Americans—consumers, stockholders, and all working people—could benefit from the kind of economic statesmanship that dedicated management people can provide.

FACTORY has few illusions that these summit meetings—even if inspired by management statesmanship—will ever replace, or even simplify, plant-level bargaining sessions. But we feel it is foolhardy and wasteful to expect plant-level managements to settle social issues affecting the national economy. FACTORY urges the NAM to assume responsibility for this leadership. We subscribe to Mr. Mitchell's viewpoint. We believe that these meetings—entered into with vigor and determination—can provide guideposts to peaceful labor relations.

L. R. Bittel

EDITOR-IN-CHIEF

MITCHELL: The

Some observers have called the labor-management summit a waste of time—impossible. In this *exclusive* interview with Secretary Mitchell FACTORY's Al Adams gets the *behind-the-scenes story.*

Summit "is the sole responsibility of management and labor."

Labor Secretary James P. Mitchell is the idea-man behind the labor-management summit.

A summit conference suggestion, originally, was offered by AFL-CIO chief George Meany near the end of the big steel dispute. Meany asked Mitchell to arrange such a conference for one specific purpose—to discuss emergency strike legislation. At the time, both sides were concerned that Congress might devise some form of compulsory arbitration to force a steel settlement.

Mitchell, however, has turned the idea around. He proposes that leaders of both sides get together, not under the gun of a steel strike, but to find ways to prevent such strikes in the future. He feels the steel dispute shows clearly that labor and management have lost the talent to talk to one another.

"If they can't communicate," Mitchell says, "how are they going to prevent similar situations in the future." And these future problems, as Mitchell sees them, almost dwarf the issues that labor and management have tangled on in the past.

Just to have a government-sponsored conference is hardly the answer. Mitchell knows the past record, and industry's reaction to that record: 1918, the War Labor Conference board; 1919, the Industrial Conference; 1941, the Labor-Industry Conference; 1945, the President's National Labor-Management Conference. Even under the pressure of wartime or postwar emergencies, these conferences could hardly be called successful.

WHEN THEY MEET...

What prospect is there for a 1960 conference without the pressure of a national emergency or some other government threat? Mitchell attempts to answer this by devising a new-style conference. He would like to see these suggestions followed:

• **The Eisenhower Administration is to take no part.** "The Tripartite Conference," says Mitchell, "is doomed to failure. This has to be the sole responsibility of management and labor—they have the ball."

• **The "summit" conference is to be abandoned as soon as possible,** to be replaced by meetings of labor and management of a given industry—steel, automobiles, railroads, and so on. "They have common interests, and common problems," Mitchell notes. "This is the most fruitful kind of conference, rather than the so-called summit."

• **"No resolutions, no statements . . . meetings to be continuous"** is Mitchell's suggestion. He wants the officials to discuss in private, out of the spotlight, so no part of the game for either side will make an impression with the public.

• **Collective bargaining issues are to be kept off the agenda.** There's no quicker way, Mitchell believes, to break up a conference than to get into matters that need the give-and-take of negotiations.

• **Conferees must be AFL-CIO union presidents and presidents of companies organized by AFL-CIO unions.**

If these aren't sufficient restrictions or qualifications for a labor-management summit conference, Mitchell has one more idea.

"The parties don't have to agree. We hope that just by meeting they'll improve communications, get one another's point of view, and thus make bargaining more intelligent."

Indeed, the subjects the labor secretary hopes will be discussed are bargaining issues when they're broken down. Wage increases and productivity certainly line up together. Work rules—a subject that tied up the steel industry in a record strike—is the hottest negotiation issue today. Foreign competition, of course, affects management's position at the bargaining table.

What he proposes, however, is a general discussion of each of these critical matters, where each side will lay out its general point of view and "see if they can't at least talk about the same thing when they're on the same subject."

BITTER MEMORIES...

The 1959-60 nationwide steel strike still stirs bitter memories. Communications between a key industry and a powerful union broke down. The strike went on for 116 days over one issue alone—work rules. Eisenhower and Mitchell warn that there are six issues equally as critical facing management and labor in the months and years ahead.

These issues—says Mitchell—must not be fought out on the picket line. They are all fodder for employer-union battles unless, somehow, they can be talked out before they reach a critical stage around the bargaining table. Each is a potential source of trouble and, unless checked, will get worse.

AND BIG ISSUES...

Labor Secretary Mitchell ticks off these as prime "summit" topics:

Inflation—Management sees it as wages, labor as prices. They describe it differently for different reasons. They should at least get one another's viewpoint.

Foreign competition—This means jobs to workers, markets to employers. This is something they both have to wrestle with.

Worker education—More skills are required, a better basic education. The need is not only for in-plant training. Skills must meet industry's needs for the future.

Work practices—The issue has failed so far in collective bargaining. Both labor and management need new viewpoints—unions to help eliminate "archaic practices," management to "understand the human element"—in these working rules.

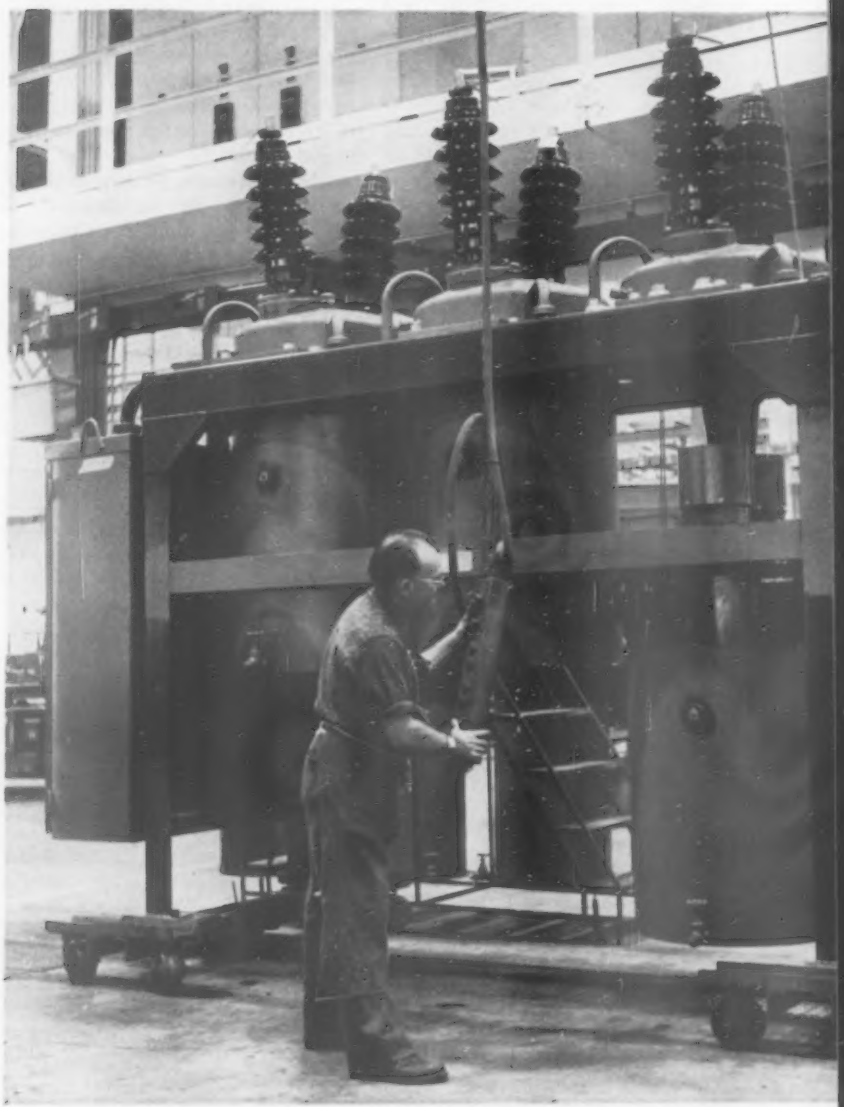
Automation—Unions should have adequate job protection, employers must be permitted to achieve growth.

Productivity—When they talk about productivity, they don't mean the same thing. Management talks about unit costs, labor about something else. Since productivity is often a basis for pay raises, they should at least try to discuss the subject in the same terms.

In all these issues, says Mitchell, labor and management have a mutual concern. Economic growth, he explains, depends on management's willingness to invest capital. Unions have a stake in keeping alive.

Mitchell does not expect unions and employers suddenly to give up all their differences. "But they should develop mutual respect and better means of communications." This could be achieved through successful conferences.

Formerly, these giants were built on one spot,



ASSEMBLY-LINE *SPEED* FOR JOB-SHOP GIANTS

Thumbing its corporate nose at the traditional (and ineffective) way of doing job-shop operations, Westinghouse Electric Corporation recently moved an 1800-unit-per-year operation into a new assembly-line home. What happened to the concept that job-shop orders are best assembled in one spot? That obsolescent thinking was left behind when the company moved the production of heavy-duty circuit breakers into its new Trafford, Pa., plant.

The product: oil-filled circuit breakers of the floor- and frame-mounted types, for interrupting excessive currents on high-voltage electric utility power lines. Of the two types, frame-mounted breakers (on these two pages) are classed as medium-voltage equipment for circuits from 14,400 to 69,000 volts. The floor-mounted breakers (pages 72 and 73) are for high-voltage applications on circuits above 69,000 volts. In both types, three separate tanks are used to enclose the three circuit-interrupting devices required for three-phase circuits.

Previously, both types were assembled by true job-shop practices: for each breaker, every phase of assembly was carried out at a single station. All individual operators in the assembly group had to be qualified to perform all the operations.

In contrast, both types of breakers are now progressively assembled on separate multi-station conveyorized assembly lines. Personnel at each station are now responsible for only a particular phase of the total assembly operation. They require no formal in-

but now... they're highly mobile as they roll down this assembly line.

ROLLING down the bottom leg of an L-shaped conveyor in sets of three, domes for the top of frame-mounted circuit breakers are the first components to come into the entry end of assembly line.

LOWERING the top frame onto the domes, the worker above is positioning these units for welding. Semi-finished and painted, the frames arrive from a secondary feeder line. Here breaker top is inverted.

INVERTING the top assembly calls for a specially designed turnover fixture that can be adjusted to fit any of the four standard frames for circuit breakers built on the line.

FITTING bushings and contacts to the breaker tops, assemblers need to know only a fraction of the steps that were necessary when crews had to be able to assemble an entire breaker.

RAISING the completed top is done as pre fabricated ends of frame (mounted on dollies) roll into place. From here an underfloor drag chain takes breakers to testing area.

struction beyond a simple sequence outline of the parts to be mounted. Typically, this outline contains only eight or ten steps.

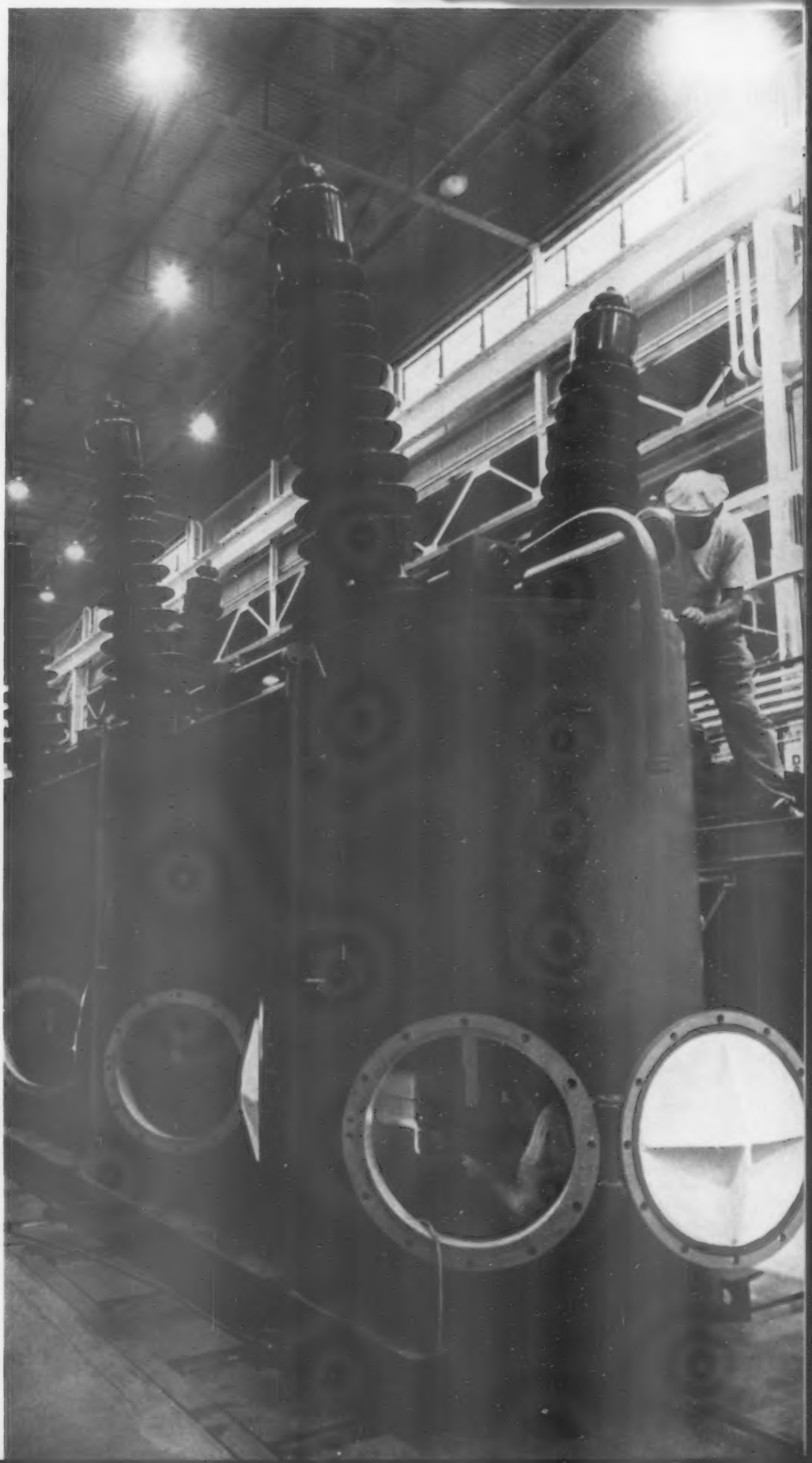
Most of the raw materials undergo processing in machining sections near the assembly line. These are organized as fabricating centers where the machines of various types are pooled to do all machining on parts for specific product lines. By this departure from earlier practice—when machines of similar types were grouped together, as in most job shops—material handling was substantially reduced.

Among the various machining sections producing components for a specific product line is a programed machine-tool center for the production of parts for floor-mounted (high-voltage) circuit breakers. Concentrated at this location are five programed, multi-purpose machine tools of three types: two No. 3 automatic chucking lathes, two multi-spindle tape-controlled turret drills, and a tape-controlled combination milling and drilling machine.

At this center, repeat orders are quickly put into production by loading the numerically controlled machines with programs kept on permanent file for each job. So far, programs for 16 different parts have been developed and filed for the milling-drilling machine and for 51 parts on the automatic turret drills. Production experience with these machines indicates that automatic sequencing is economically feasible for lots as small as 12 parts.

Turn the page

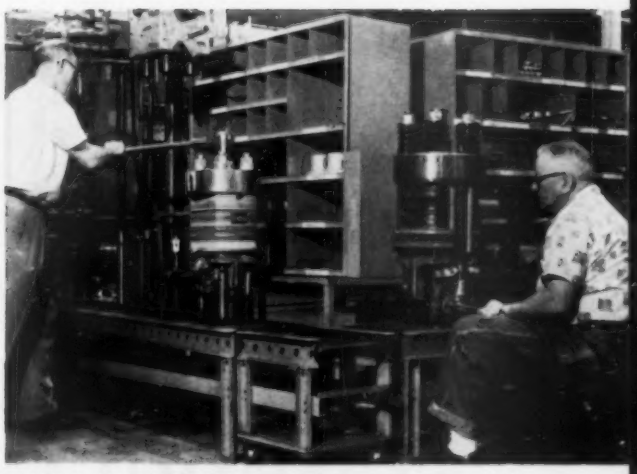
. . . ASSEMBLY-LINE *SPEED* FOR JOB SHOP **GIANTS**



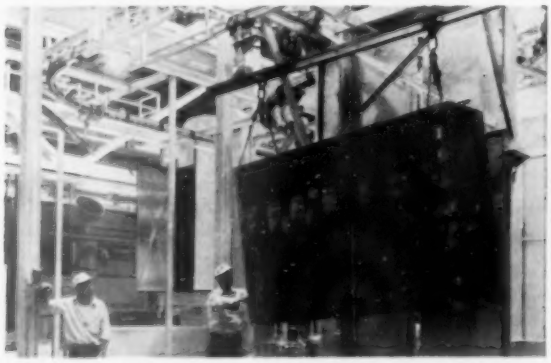
HUGE BREAKERS are floor-mounted units, considerably bigger than the frame-mounted models on the previous page, may weigh up to 22 tons. Here, a light-weight aluminum scaffolding is bolted along the breaker's length, a tow-bar is attached to an indexable in-floor drag chain, and components are mounted on the unit. Note the assembler working inside.

VERSATILE TOOLS AND SMART TECHNIQUES . . .

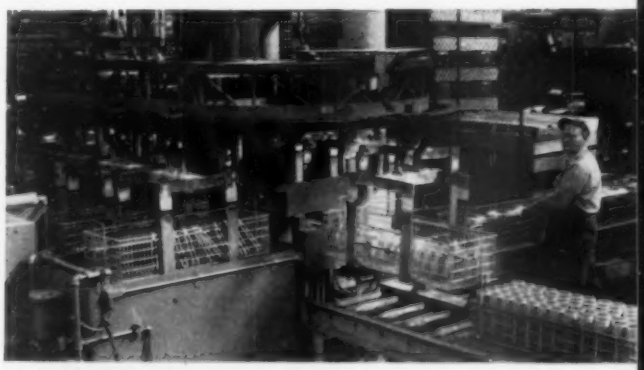
TANK SHELL moves by gravity into position for automatic submerged arc welding. The tank bottom is joined with a peripheral seam weld. Similar equipment is used at the next operation where the internal peripheral seam is welded by a stationary, broom-mounted welding head.



STATIONARY CONTACT ASSEMBLIES now built on a small conveyor line were previously made as a typical job-shop bench assembly. The new arrangement gives a substantial reduction in floor space. Components are preorganized so men can work from materials wagons without drawings.

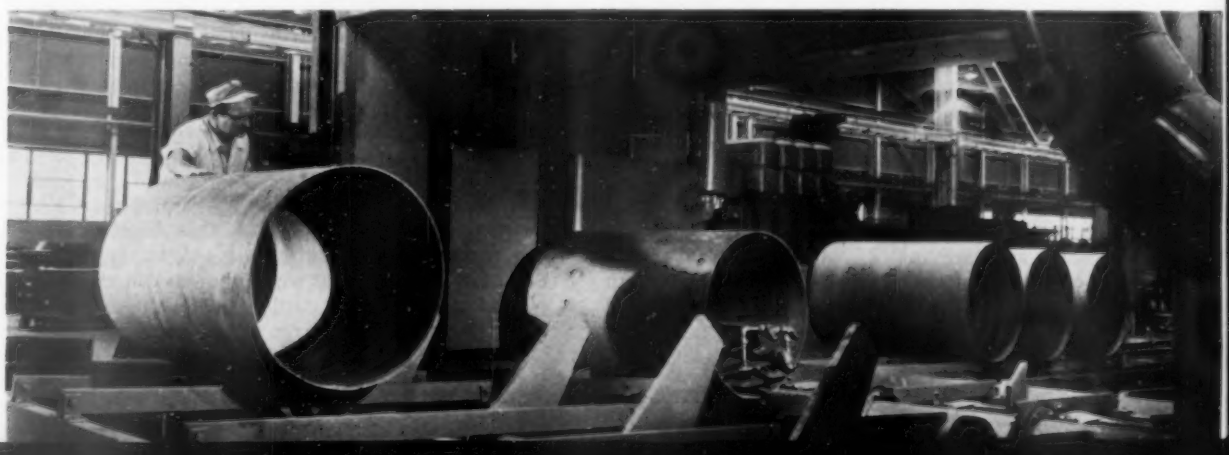


PARTS TO BE PAINTED merge from three feeder aisles into this conveyorized paint-finish system. Parts range from pencil-sized brackets to frames as bulky as an automobile body. The system includes a five-stage washer-phosphate unit, dry-off and bake ovens, dual-position spray paint booth.



CLOSED-LOOP CONVEYOR links a storeroom, an automatic bright-dip machine, and three brazing processes (induction, radiant gas, and automatic radiant gas). In the storeroom, parts go into stainless steel baskets, then travel through bright-dip to the brazing stations.

SHOT-BLAST MACHINE is self-charging, revolves a tank shell on cradle rolls while a stream of shot from nozzles on a reciprocating boom blasts both internal and external wall surfaces. Then the ram advances again to air-blast any remaining shot from the tank. The chamber doors open and cradle rolls eject the finished tank, allowing the next unit to gravity-feed into position, ready for shot cleaning.



"One of the greatest advances in construction scheduling since the Pharaohs. So good I wish I could keep it a secret."

Planning and scheduling manager, Catalytic Construction Company

CRITICAL PATH SCHEDULING

. . . CONSTRUCTION . . .

This proven technique cuts guesswork, can save you time and money on plant jobs of

By J. S. SAYER, Documentation, Inc., Washington, D.C.; and J. E. KELLY Jr. and MORGAN R. WALKER, Mauchly Associates, Inc., Ambler, Pa.

Du Pont used the technique in overhauling its Louisville plant. Result: Critical path scheduling was introduced company-wide. Dow is using it for expanding a power house. Catalytic Construction Company is using it on five projects at once. G-E, IBM, RCA, Procter and Gamble, and others are interested in it.

The jobs that control the project make up the critical path

Usually, only about 10% to 20% of the jobs in a major project control the time needed for the whole project. Any delay in these critical jobs will delay the final completion date. By putting the heat on them, however, the entire project can be completed sooner. And at far less cost than is involved in putting the project on a crash basis straight across the board. There is always at least one continuous chain of these critical jobs running through every project, from start to finish. This chain is called the critical path. Proper control and manipulation of the jobs that make up this critical path can give you control over the time and cost involved in an entire project—regardless of its size.

The critical path controls the project completion date

A common error of traditional scheduling is that someone arbitrarily plucks a target completion date out of the air and everybody digs in to meet it. With critical path scheduling, you estimate the time needed for each of the *critical* jobs, add them together, and *then* reach for the calendar. If you're unhappy with that date, you know just what jobs you can expedite, by how much, at what cost, and with what effect on

MODERNIZATION...

MAINTENANCE

the rest of the project. You'll also know who should be informed of the changes. There will be less need to send out blanket memos to be sure the right people get the word on changes.

A Du Pont group, charged with a plant modernization project, originally thought the two factors determining their project completion date were the availability of manpower and the cost of overtime payments. The critical path scheduling techniques proved that both these factors were irrelevant. The actual determining factors were (1) the time needed for electrical design, and (2) the delivery dates of certain special equipment.

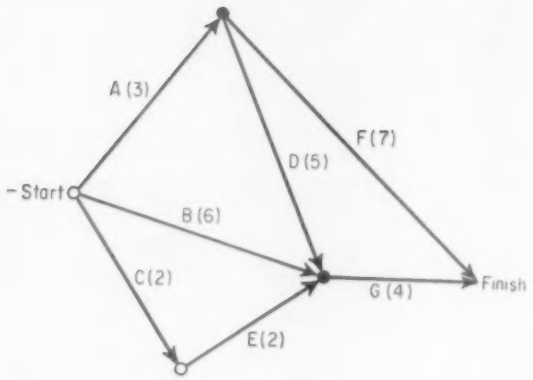
Further analysis of the critical path diagram revealed that by juggling the installation sequence of electrical equipment, the entire project could be compressed and reduced by 21 working days. Result: The modernization was completed ahead of the original schedule. And getting back into production three weeks early saved real money.

The technique separates planning and scheduling

The critical path technique forces management to recognize planning and scheduling as two distinct functions. For example, the planning of sequence of roof construction on a building job would be done as a separate critical path analysis operation prior to scheduling of deliveries and installation. This is different from the usual practice. Managers and their staffs, as a rule, try to plan and schedule in one operation. Frequent result is they get swamped if the project is complicated. In the midst of pressure and confusion, they may easily overlook something that will knock the schedule galley-west later on.

For the technique of critical path scheduling, turn the page

One plant project group thought it had 156 critical deliveries on a major job. This technique proved there were only seven, three originally overlooked.



Critical path scheduling is a 4-phase technique

You can do only phase one and come out with definite advantages. Or you can go through any of the other phases, with progressively greater benefits. Each phase is more rigorous than the last, and getting information you need for the later steps may cost more time and money than you're willing to sink into many one-shot projects. But, especially for projects undertaken periodically, it will often pay you to dig out the information and keep it current.

Phase 1: Planning—with a difference

The first step is to list everything that has to be done and put the jobs in proper sequence. (An obvious example: The wooden forms will have to be finished before you can pour the concrete.)

The next step—arrow diagraming—is the heart of the technique. Each job is indicated by an arrow. The length of the arrows is not important, but their direction indicates the sequence of jobs. The diagram is constructed by taking each job in turn and asking three questions: (1) What immediately precedes this job? (2) What immediately follows this job? (3) What other jobs can be done at the same time?

Only those jobs *immediately* related to the one at hand are considered. This way, you won't get buried when diagraming complex jobs. Projects with as many as 1700 jobs have been handled with this technique. The seven-job project diagramed above is a simple example that is easy to follow.

Main advantage of the arrow diagram over Gantt or bar charts is that you can see the interrelationships of the project jobs at a glance. In our example, for instance, it's obvious that job G can't start until jobs B, D, and E are completed. But before that, jobs A, B, and C can all get underway. In addition to the technical relationships of all the jobs, the diagram shows the scope of the project, and helps pinpoint responsibility for each job. Equally important, you won't overlook any jobs that belong in the project.

Phase 2: Plug in the time element

To start, you estimate the duration of each job. Wild guesswork at this stage will destroy any benefits you might receive from the technique, so get the best estimates available. (Possibly the most realistic estimate will be that of the craftsmen—or the crew chief—who will perform the work.) At this stage, you want figures for straight time, normal delivery schedules, with a typical work force. The normal time estimate in days for each job is written in parentheses beside the arrow that represents that job.

Now add up the duration of all the jobs along each possible path. The longest one is the critical path. Any delay in the completion of these jobs will delay completion of the whole project. The rest of the jobs are "floaters." You have a certain amount of leeway in completing these jobs without affecting the target date of the project. Of course, the amount of "float" in each job is limited.

Advantages at the end of the second phase: First, all critical jobs are identified and the amount of float in each of the others is known. Second, you know your potential problem areas, you can ride herd on them instead of galloping off in all directions when "something" goes wrong. Finally, you have a graphic tool to examine for better schedules and possible improved job sequences. It's a detailed timetable.

Phase 3: Plug in the dollars

Most projects can be done in a number of ways, from minimum cost (maximum time) to minimum time (maximum cost). The beauty of critical path scheduling is that it permits you to make an educated choice between these extremes at a point that's "best" for your operation. To gain time, all you must do is compress the schedule along the critical path, which automatically shortens the over-all project time. This is more efficient, and far less costly than pushing everything on a crash basis across the board.

Let's pull some figures out of the air, put them into our original seven-job example, and see how this phase of the technique works. The cost table above is an example of possible times and costs. Assume that job E is one that cannot be hurried, no matter what you're willing to spend. The "cost slope" column shows the extra cost you will incur for each day of time cut out of the various jobs. The days shown in the "crash" column are the minimum days it takes to

COST TABLE

JOB	NORMAL		CRASH		COST SLOPE
	DAYS	DOLLARS	DAYS	DOLLARS	DOLLARS/DAY
A	3	$ 50	2	$ 100	$ 50
B	6	140	4	260	60
C	2	25	1	50	25
D	5	100	3	180	40
E	2	80	2	80	—
F	7	115	5	175	30
G	4	100	2	240	70
	Total	$610	Total	$1085	

do each of the jobs. The critical path (see diagram) is A-D-G, the sum of the longest consecutive jobs.

- **12 days**—Normal time for this project is therefore (3 + 5 + 4) days, for a total of 12 days.
- **11 days**—The cheapest way to gain a day with this project is to reduce job D by one day, for an additional cost of $40.
- **10 days**—You can also cut job D down another day, for a 10-day project and an $80 penalty. But now jobs B and G together, and jobs A and F together, will each take 10 days, too. So it wouldn't help to cut D further. The project time is now determined by other jobs.
- **9 days**—To cut the project to 9 days, you must reduce jobs A and G by one day each at a cost of $120. But you can gain $40 by extending job D again. Net cost: $80.
- **8 days**—Now you can pare jobs F and G and cut the project time to 8 days.
- **7 days**—A cut to less than 8 days is really sticky. Three separate routes each add up to the 8-day total. They are: route A-F, route B-G, and the original route A-D-G. Each is now a critical (longest) path. So to cut another day, you must take a day out of jobs B, D, and F. Net cost of all reductions is $350. This is your minimum time/maximum cost schedule.

There is still one more day that could be cut out of job B and another day of float in job C. But paying the $85 penalty would be useless, since neither reduction would affect project time.

This example is typical of the time savings that can be realized from reducing a few key jobs. **Actual results in the field show that you can usually gain significant reductions in project time at less than a 5% increase in total cost.** In the example, the project is compressed to the limit without regard for costs. That's unlikely with actual projects, because the gain in getting into production sooner might not offset the cost of rushing the project.

Phase 4: Put the project in perspective

This step introduces the cost of lost production, the availability of labor and materials, and associated outage costs. To show how these indirect considerations can affect schedule decisions, we have generated some arbitrary outage losses in the table below. The best project schedule is the one that has the lowest total cost. Here, schedule III is clearly best: 10 days at a total cost of $1430.

INDIRECT COSTS

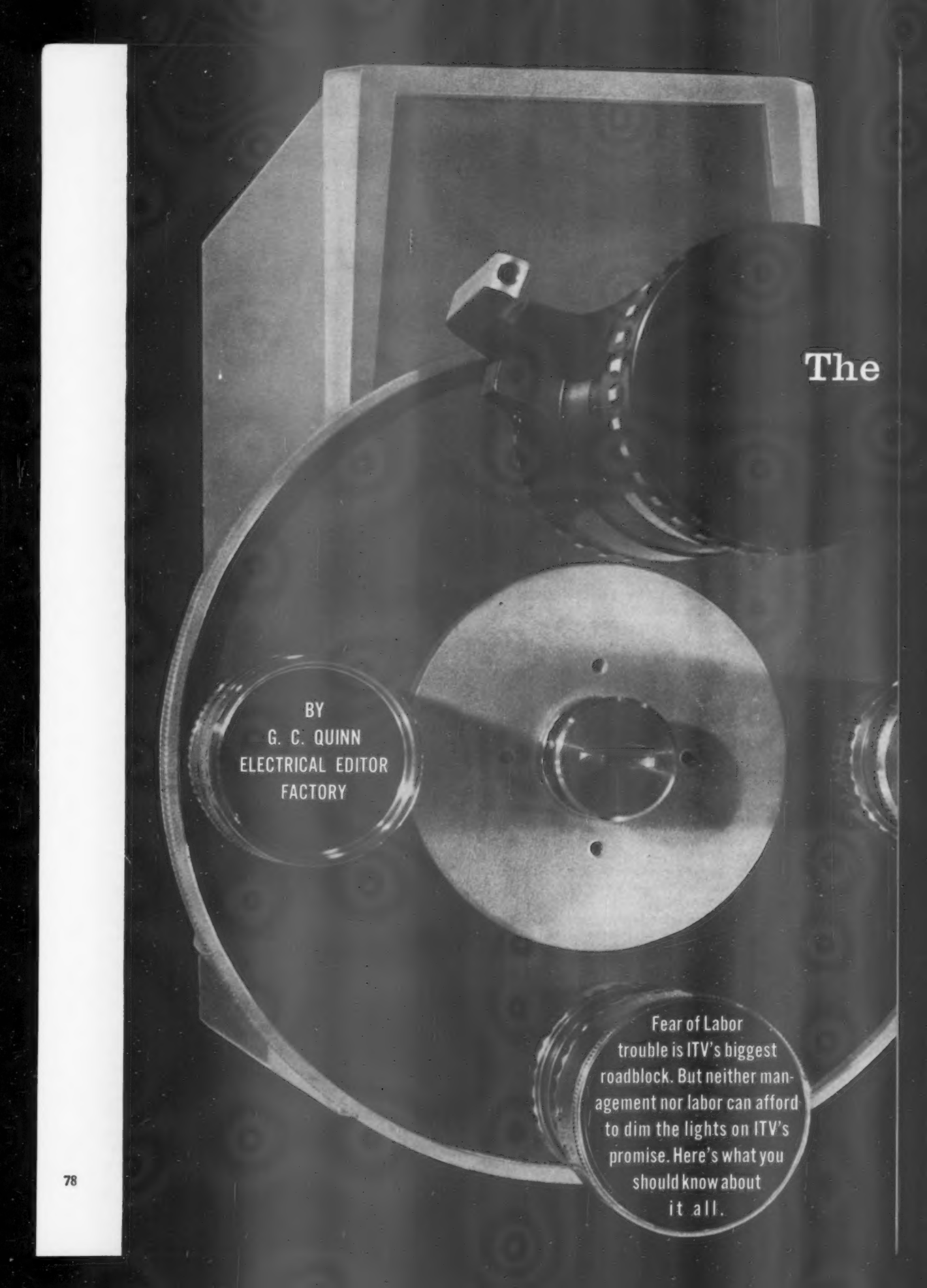
Schedule	I	II	III	IV	V	VI
Days	12	11	10	9	8	7
Project Cost	$ 610	$ 650	$ 690	$ 770	$ 870	$1000
Outage Loss	$ 900	$ 820	$ 740	$ 700	$ 660	$ 620
Total Cost	$1510	$1470	$1430	$1470	$1530	$1620

Critical path scheduling pays off in informed decisions. If you hand the cost table and outage loss to a subordinate with no special training and ask him to pick the best schedule, it would be like asking a blind man to draw a line through a dot on a dance floor. But with critical path scheduling, picking the best schedule would be a lead-pipe cinch.

Computers conquer the more complex jobs

Of course, you've been given a demonstration with loaded dice. If the example had 1700 jobs instead of seven, you'd go arrow-crazy trying to pick the proper schedule by trial and error. Fortunately, you wouldn't have to. By constructing mathematical models of the situation and putting them through a desk calculator or an electronic computer, you can have your answers without a strait jacket.

This doesn't mean you must have a computer and an understanding of parametric linear programing to benefit from critical path scheduling. There are plenty of service firms in a position to run such computations as these on a fee basis. Or, if you have access to a computer, you can have your own people learn the technical mysteries of critical path scheduling in about a week. It can be done with paper and pencil, when the jobs aren't too complex. Either way, it pays off in informed decisions.

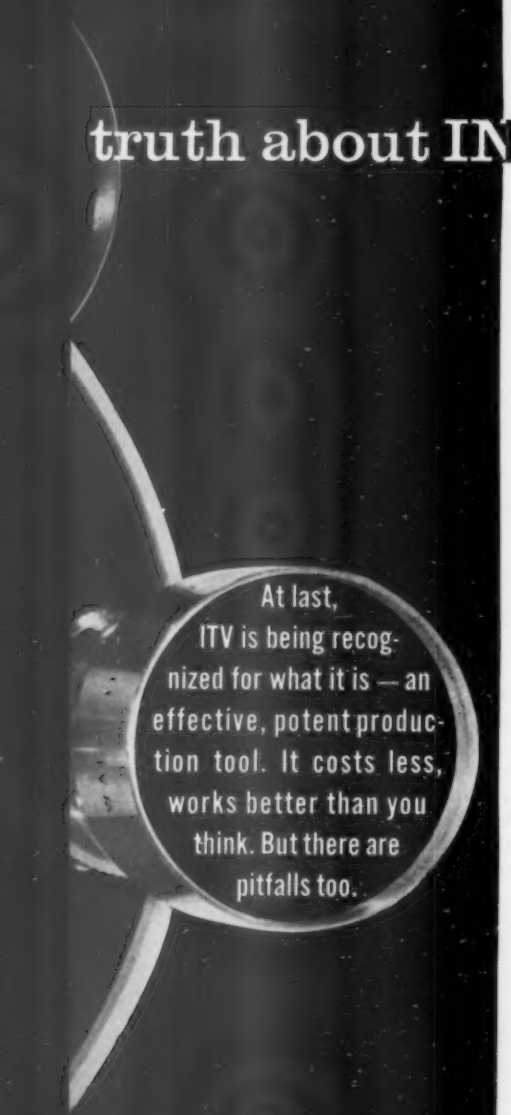


The

BY
G. C. QUINN
ELECTRICAL EDITOR
FACTORY

Fear of Labor trouble is ITV's biggest roadblock. But neither management nor labor can afford to dim the lights on ITV's promise. Here's what you should know about it all.

truth about INDUSTRIAL TV



Video pioneers thought television would find its place in the sun of science and industry, rather than in entertainment.

The idea of using a closed-circuit television system to watch an industrial process (ITV) is, in fact, older than commercial television. But today it stands deep in the shadow of its successful cousin.

ITV equipment has been available since World War II. But many managers and engineers in industry still subconsciously put the equipment in the gadget or novelty class.

- **Item**—Plants that have installed ITV are generally well satisfied with performance.
- **Item**—Payoff frequently takes only a few months. Some plants now depend completely on ITV control over production machinery.
- **Item**—A good system can be installed for less than $2000, yet sales are so limited that the biggest ITV manufacturer still builds cameras a a few dozen at a time.

Why these inconsistencies?

FACTORY talked to the people who design, make, sell, install, and maintain closed-circuit television systems for industry—and to the unions who have a stake in the way ITV is used. The facts and opinions we collected can help you to evaluate whether or not ITV is for you.

Accurate figures on ITV growth are hard to come by. Commercial sales of TV systems (hotels, banks, etc.) are not separated from those in plants. Since many systems are sold through dealers, equipment makers don't really know where all their equipment ends up.

Geographically, too, ITV usage is spotty. The New York-New Jersey metropolitan area and the West Coast are bigger users than the Detroit or Chicago industrial areas. For instance, interviews with six leading ITV dealers in the Chicago area revealed that none of them felt that sales to plants were anywhere near present potential. By contrast, one New York ITV distributor lists over 125 installations, some of them using monitors and cameras by the dozen. Disappointed, but by no means discouraged, one Chicago dealer put it this way: "We've spent four years demonstrating to steel mills, factories, labs, and warehouses, and sold our share. When ITV does catch on here, we'll be in on the ground floor. We can't quit now—we've got too much invested."

One spokesman estimated that fewer than 2000 vidicon camera tubes were sold to industry in 1959. This includes both new and replacement tubes for about 90% of users.

But this hasn't kept new manufacturers from entering the field (and dropping out) every year. About 20 makers now sell (mostly through franchised dealers) systems designed and priced for industry.

While selling through dealers has generally been successful, it points

Photo on this page by Joe Ruskin, McGraw-Hill staff at Blonder-Tongue Labs, Newark, N. J.

up some of the difficulties an industrial plant user has to keep in mind. Many dealers have been commercial sound system men, perhaps regular home TV service men. Some haven't realized the punishment that dust, humidity, fumes, or a vibrating mounting can give unprotected electronic equipment. To come in with a low bid, they may fail to insist on proper mountings, enclosures, lighting, control, or voltage regulation equipment. They have had little experience in "selling" operating employees in the plant on ITV. A few years of unrealistic low bids, plus too many "free" and fruitless demonstrations, turn most dealers into ITV experts—or ex-dealers.

Basic system—There are four essential elements in a closed-circuit TV system: camera, control, cables, monitor. A simple system costs just under $1000, a heavy-duty system around $2000. With proper equipment one camera can serve several monitors or one monitor any number of cameras.

THE CAMERA SPOTS YOUR SUBJECT

The basic camera consists of a lens (a standard 16mm movie camera lens), a vidicon camera tube, and associated electronic circuits. (Diamond Power Specialty Company uses an image-dissector cold cathode camera tube. These more expensive, longer-lived tubes are especially adapted for viewing flames and infra-red illuminated areas.) Picture quality is measured in terms of horizontal and vertical definition (number of lines or electron beam sweeps per inch). Horizontal definition ranges from 250 to 600 lines. (A good-quality home TV receiver has about 350-line definition.) High resolution may not be necessary for many plant jobs. But when people must be identified, or a bulge under an employee's coat must not go unnoticed, or license numbers of an incoming truck must be recorded, a well-defined picture becomes important. You will have to pay 25% to 100% more for the higher quality systems.

CONTROLS IMPROVE THE PICTURE

The control serves three functions: It amplifies the weak signal from the camera tube, it provides adjustment of camera operation to get best performance under varying light and conditions, and it provides pulses to keep the picture tube and camera tube synchronized.

Some of the ITV equipment sold has control (and amplifier) circuits built into the camera housing. If the camera is to be mounted in an inaccessible position, a separate control chassis is a necessity. All TV camera controls need occasional adjustment, depending on picture quality requirements. The man adjusting the control needs either to see the monitor, have one of his own, or be in touch with some one watching the monitor. If the camera and monitor are not too far apart, controls should be at the monitor.

CABLES CARRY THE SIGNAL

Camera and control output is fed at video (medium) frequencies rather than the very high frequencies used for commercial television. For views up to a few hundred feet, ordinary coaxial cable (about 10¢ per foot) will do. At distances up to another 1000 feet, better grade coaxial cable (up to 30¢ per foot) will be needed. Where camera and control are separated, the cable between them (35¢ to $1 per foot) must combine coaxial cable, plus several other sets of cable pairs, to handle control functions. Cables can be buried or suspended from poles.

THE MONITOR LETS YOU SEE

The basic chassis for a typical ITV monitor costs from $250 to $300. In cabinets and with regulated power supply, prices vary from about $500 to $700. It is frequently possible to match monitors from one manufacturer to another brand of camera. Lower quality monitors will require more frequent adjustment—a problem if your operator is busy. The smallest screen that will do the job is best, since it produces the brightest picture. Remember that reflected glare on the screen face is often more of a problem than ambient brightness. Industrial installations have virtually standardized on 14- or 17-in. screens, with 8-in. units for tight spaces.

ACCESSORIES COMPLETE YOUR SYSTEM

The most frequently used accessories are those providing remote control or special protection for the camera. If lighting at the object varies widely, it will be necessary to add remote iris control. Remote focusing may also be needed when more than one lens is used or if the camera is in a high-vibration area. Both functions involve motor operations within the camera. Costs vary widely among manufacturers. Where both close and distant objects must be viewed with one camera, a remotely controlled multiple-lens turret or Zoomar lens must be added. This adds another $600 to $1200.

Dustproof, weatherproof, and explosion-proof camera housings are available. Costs vary from $200 to $500, plus about $75 for a remotely controlled windshield washer-wiper. For furnace or kiln viewing, a water or air-cooled enclosure is necessary ($400-$500).

AND, OF COURSE, THERE'S MAINTENANCE

ITV has suffered more than it deserves from rumors of excessive maintenance costs in early installations. Trouble is, most of the early units were built too much like home-entertainment-type TV receivers.

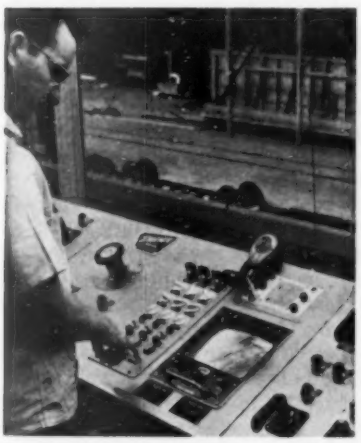
In practice, ITV equipment seems to require no more actual maintenance than comparable electronic gear, i.e., two-way radio. In FACTORY's Electrical Survey (August 1958, page 52), four out of five plants with ITV systems reported their maintenance costs were reasonable.

The most expensive component in the entire system is the vidicon tube ($230). While its rated life

HERE'S ITV AT WORK IN TODAY'S PLANT

INSPECTING PRODUCTS with ITV and microscope is being done at Motorola's Phoenix plant. Black-square width on screen is less than thickness of human hair. (ITV planners expect to team camera with optical fiber bundles for convenient inspection of inaccessible surfaces.)

OBSERVING SCALES is one of a host of new ITV uses with machine tools. Here remote scales are read at Morgan Engineering. *(Diamond Electronics)*

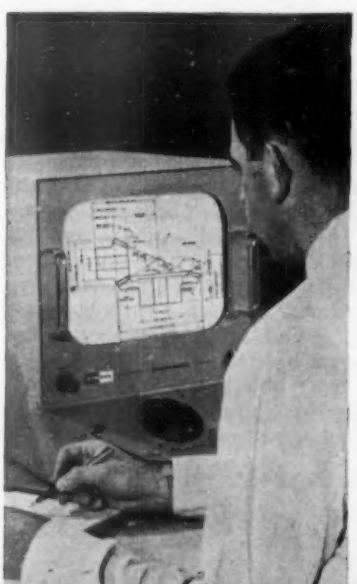


WATCHING HOT SPOTS with ITV is now standard practice in steel plants. Here, operator checks furnace discharge table over 200 feet away *(DuMont Labs)*

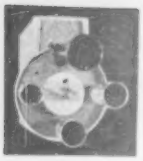
GAGING HOT STEEL billets by remote control is made possible by the use of this new wide-screen ITV monitor (developed by Grimson Color, Inc.).

CHECKING CHARTS being prepared in paper mill 900 feet away is a natural for ITV, reports Eastman Kodak Co.

SENDING DRAWINGS and views of actual production parts greatly speeds communications between engineering and production areas. *(KIN TEL Division)*



GUARDING GATES and other remote entrances is most frequent "people watching" use made of ITV. A good ITV system often allows one guard to protect an entire plant. Below, one camera covers employee and badge, while a second camera keeps visual tabs on gate. *(General Precision Labs)*



is much shorter, this tube averages about 10,000 hours or more if properly installed.

Many users prefer to contract out their ITV maintenance. For instance, Yale Transport Corporation (NYC) has 10 TV cameras surveying loading operations at 43 truck docks around the clock (FACTORY, February 1959, page 126). Once a month, a local dealer-service organization, ITV Inc., makes a quick check of the company's cameras and monitors. Every three months, all tubes are tested, lenses and parts cleaned, and electrical values checked by instruments. This schedule has virtually eliminated on-the-job failures.

One dealer points out why routine preventive maintenance is so important: "Picture quality often goes downhill slowly—too gradually for the operator to notice. Unless you check performance against a standard, you'll be getting only half a picture—and you won't be aware of the difference."

Plants doing their own maintenance say the annual cost averages 5% to 10% of original equipment cost. Expenses the first year are usually higher as a result of correcting for faulty or inadequate installation. Maintenance instructions furnished with equipment are generally adequate for any electronics technician to handle the job. Few specialized TV instruments are required.

YOU CAN AVOID EQUIPMENT TROUBLE

Here's a guide that will keep you away from maintenance troubles:

- Install camera and monitoring equipment where it will be subject to as little abuse as possible from dust, heat, moisture, contamination, vibration, and dial-twiddlers. If these conditions are unavoidable, equipment must be specially housed or mounted.
- Where economically feasible, use plenty of light on the object. Tubes will last longer if they are not used too much to "see" in dark areas. Avoid direct or near direct exposure of lens to sunlight. It is often cheaper to forget daylight and go to artificial illumination around the clock.
- Don't try to give one man more to monitor than he can do properly, especially if he is working with remote camera positioning controls. These take some skill to handle fast.
- Mechanical remote control devices need more maintenance than equivalent electrical components. Hence it is often better to use two systems than one camera and remotely controlled lens.
- If you plan to handle your own ITV maintenance, insist that the vendor supply necessary training (using *your* instruments). He should furnish a spare parts list and maintain adequate local stock.
- If your interconnecting cable extends a half mile or more, provide economical "T" junction taps at intervals for trouble shooting. Pole-hung cable is more subject to interference from two-way radio and nearby power circuits unless it is carefully shielded.
- ITV systems are very sensitive to line voltage changes. Voltage dips, swings, surges, or chronic off-voltage conditions must be eliminated right from the start. If voltage dips or swings are beyond 15%, automatic regulators probably won't do, and you'll have to run in a separate, more stable line.
- Don't specify greater picture quality than you will actually need.

YOU CAN'T IGNORE LABOR REACTIONS

The one big roadblock to faster growth of ITV is the fear of labor troubles. But neither management nor labor in any plant can afford to dim the lights on the promise of ITV. The problem is admittedly complex. Unions have threatened strikes if ITV goes in. In some non-union plants, even individual employees have been critical of its use.

The pot begins to boil when a rumor starts that the new ITV camera will eventually be used to watch workers. "Sure, it's the conveyor now, but next year it'll be you it watches," says one irate worker.

To give management some guideposts in this controversial area, FACTORY asked a cross-section of labor spokesmen for comments. Few unions have studied the ITV question at the national level (as they have automation, for instance), although it has been the subject of many negotiations at the local level. An American Arbitration Association spokesman could not recall any case where an ITV installation had come up for arbitration.

J. C. McGahey, who heads up 76 locals of the United Plant Guard Workers said, "As long as they use our people to man the systems, we are just going to have to live with it. Personal contact by plant guards can't be replaced by a TV screen. When someone is seen stealing—will a guard be able to get there before it's too late?

"If the problem of laying off guards does arise, we will try to do something through collective bargaining. Perhaps it will be necessary to provide a guard as well as a TV camera."

The use of in-plant movie cameras (photographing employees on the job) was an issue in the 1955-56 Westinghouse United Electrical Workers (UE) strike. UE spokesmen consider ITV cameras in the same category: "One ITV installation at Westinghouse's Lester, Pa., plant had to be removed. Our locals have resisted in many plants where management has tried to put in TV and we plan to keep on resisting."

The UAW (AFL-CIO) has no formal, clearly defined policy on closed-circuit TV monitoring. It reports: "There are no major plants employing UAW members that have installed such units permanently. If it is in use, it has not been called to the attention of the international." The union spokesman continues: "About four years ago, a large Indiana plant installed TV, but met with such prompt and vigorous opposition by workers and union that it was removed. The good uses to which TV could be put, such as guarding against pilferage, cannot compensate for the inherent bad features."

"We don't object to TV monitoring because it might displace workers," observes the UAW spokesman, "but we revolt against the 'Big Brother is

watching you' aspect. We will oppose any company that tries to install it. It takes on the character of eavesdropping—a stool-pigeon approach which is degrading and not in keeping with man's dignity."

Although steel plants depend more on ITV systems than any other manufacturing industry, a United Steelworkers spokesman at Pittsburgh headquarters says the topic has not as yet been discussed at the national policy-making level.

"If any manager in a Ladies Garment Workers Union shop tried to put in TV so he could oversee workers . . . I think there'd be a riot," is the view of an ILGWU spokesman. "With that around, you couldn't scratch yourself without the boss watching."

One interviewee declares: "Anyone being watched has a right to the personal presence of his boss. Otherwise, the boss won't understand the problems of the worker's actual environment. Watching workers via TV will harm labor-management relations."

The installation of ITV in unionized plants hasn't been as much of a thorny path as union statements might indicate. FACTORY found no records of union complaints where ITV was installed as part of a machine tool, or where workers' safety or convenience was substantially improved. Some compromises have had to be worked out. A New Jersey plant installed ITV to keep track of flow of stock on conveyors from the production control office. Employees complained when they found they had to work in areas covered by the camera. Since "product watching" rather than "people watching" was the goal, management agreed to mask out normal working areas on the monitor screen.

BUT YOU CAN AVOID LABOR TROUBLE

Out of discussions with union leaders, dealers and manufacturers, and plants using ITV, these conclusions can help you avoid trouble:

- Study your long-range needs for ITV first. If you expect employee misunderstanding, install those systems first that advance the employee's safety, production bonus, or job status.
- Where it is true, make sure employees (and management too) recognize that control of an ITV system upgrades an operator's job.
- In discussions with employees, be careful to point out that ITV is not "automation." A man will always be needed to watch the monitor.
- One way to avoid the "Big Brother" feeling is to put duplicate monitors where employees, too, can see what's on the screen. One ITV "people watching" installation has an extra monitor in the employees' rest area.
- If you're convinced you really want to supervise employees' work with ITV, there's only one point at which it will be readily accepted—that's when the plant is being built. (One eastern printing plant installed ITV camera enclosures and cables before the presses were moved in. Employees knew from the day they started work that ITV was a normal part of the working environment. The cameras themselves were not installed until later.)
- If you are not sure of worker cooperation, consider first leasing ITV equipment on a 90-day basis.

LOOK TO ITV FOR HELP IN THESE AREAS

PROCESSES—Use TV to observe and inspect:

Automatic or manual assembly in inaccessible areas.
Flow of material on conveyor in inaccessible areas.
Level of material in remote storage areas.
Flow of material into and from remote machinery.
Material-handling equipment for position and direction.
Incoming and outgoing vehicles and railroad cars.
Discharge of smoke or effluent.
Tool performance or condition.
Optical aligning of jigs, fixtures, machinery.
Performance of unattended production equipment or auxiliaries.
Ingots during rolling and cutoff.
Product flow in kilns, furnaces, and other hot areas.
Handling, packing, removal of explosives.
Pouring of hot or molten material and metals.
Performance of equipment or processes in contaminated areas.

PRODUCTS—Use TV to observe and inspect:

Small parts during or after assembly.
Tool cutting or forming surfaces.
Inaccessible pipes, vessels, fittings.
Counting operations in remote or dangerous areas.
Testing of hazardous products.
Testing products in dangerous or inaccessible areas.

PROPERTY—Use TV to watch:

Roof, fuel storage, or dumping areas for fire danger.
Unfenced security and outside storage areas.
Plant boundary areas and fences.
Plant parking lots.

INFORMATION—Use TV for:

Remote instrument and data transmission.
Reports on flame or radiant surface conditions.
Drawings, photos, and small parts views.
Recovering stored data from central mechanized files.
Employee training communications.
Management-to-employee direct exchange.
Silent paging.
Observing construction job progress.
In-plant person-to-person communication.

PEOPLE—Use TV to observe:

Employees in hazardous working areas.
People in shipping or production areas to prevent theft.
Access to gates, doors, security areas.
Instruction and direction of personnel in remote areas.
Employee rest and loitering areas.
Work backlog, and output for scheduling purposes.

NEW LANGUAGE CREATED FOR PALLET-RACK USERS

To bring conformance out of confusion, the Rack Manufacturer's Institute has just adopted standard nomenclature. Now all leading rack manufacturers and your purchasing department can talk the same language.

These new standards, adopted by 14 leading rack manufacturers, describe the pallet rack: parts, measurements, arrangements. Here's *your* language guide.

PARTS

Braces—Frame members that support and position vertical members. Horizontal braces join posts. A bearing brace joins two posts at bases, rests on floor. Diagonal or "X" braces supplement horizontal ones.

Beam—Load-carrying members—any structural or formed member selected by manufacturer.

Back-to-back tie—Connection that holds constant space between two single racks. Non-rigid type acts only as a spacer. Rigid type makes a moment connection between two racks, adds rigidity to arrangement.

Deck—Solid covering of wood, steel, hardboard, etc., placed on shelf, acts as platform for pallet.

Frame—Assembly of vertical and horizontal members that hold load-carrying members in position. Referred to as "upright frame."

Front-to-back members—Structural parts of shelf joining the two beams. May be welded, mechanically connected, or dropped into place.

Plate (bearing)—Plate that is placed directly under a post to distribute load on floor more evenly.

Post—Individual vertical member of upright frame.

Shelf—Inclusive name for horizontal load-bearing members attached to two upright frames. They support the pallet or other type of load.

Shelf connector—Attachment for connecting shelf to upright frames and normally welded to the beam. These connectors prevent pantographing of racks.

MEASUREMENTS

Bay—Distance between two upright frames spanned by the shelf.

Beam size—Measurement from beam top to bottom.

Horizontal clearance—Horizontal dimension of bay. It equals net clearance between upright frames, not dimension between center lines.

Over-all depth—Over-all dimension of rows of racks, between outside edges of vertical frames.

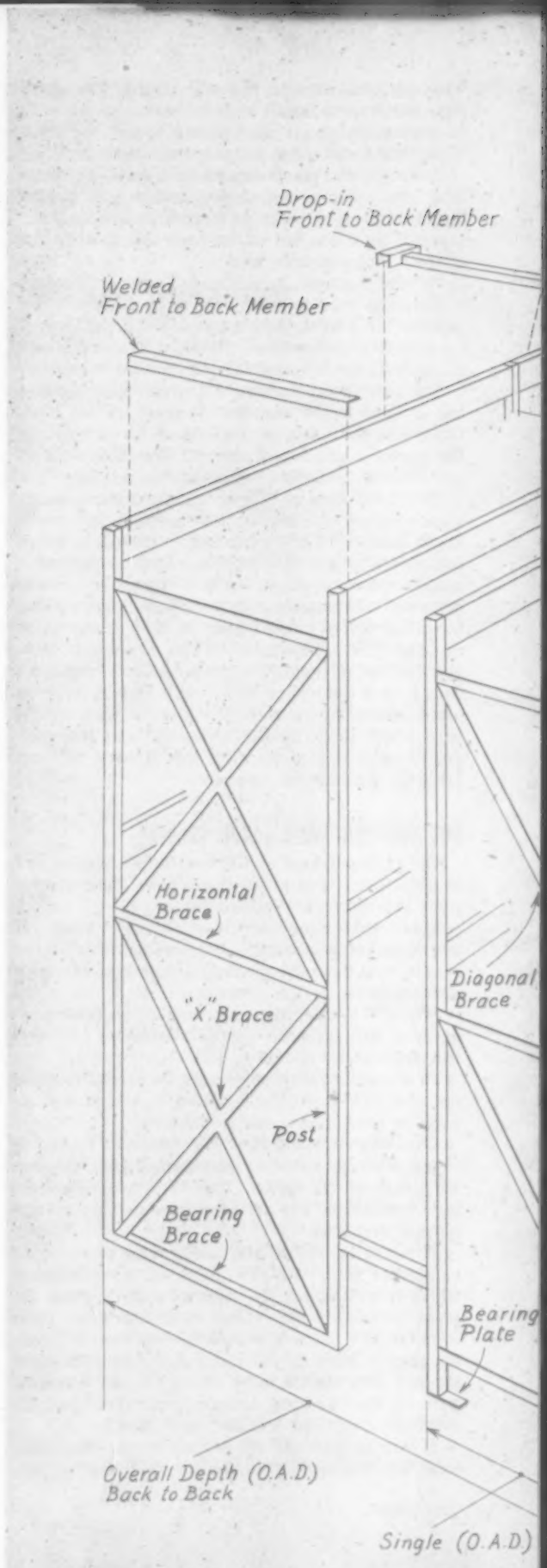
Over-all height—Dimension from floor to topmost part of rack assembly.

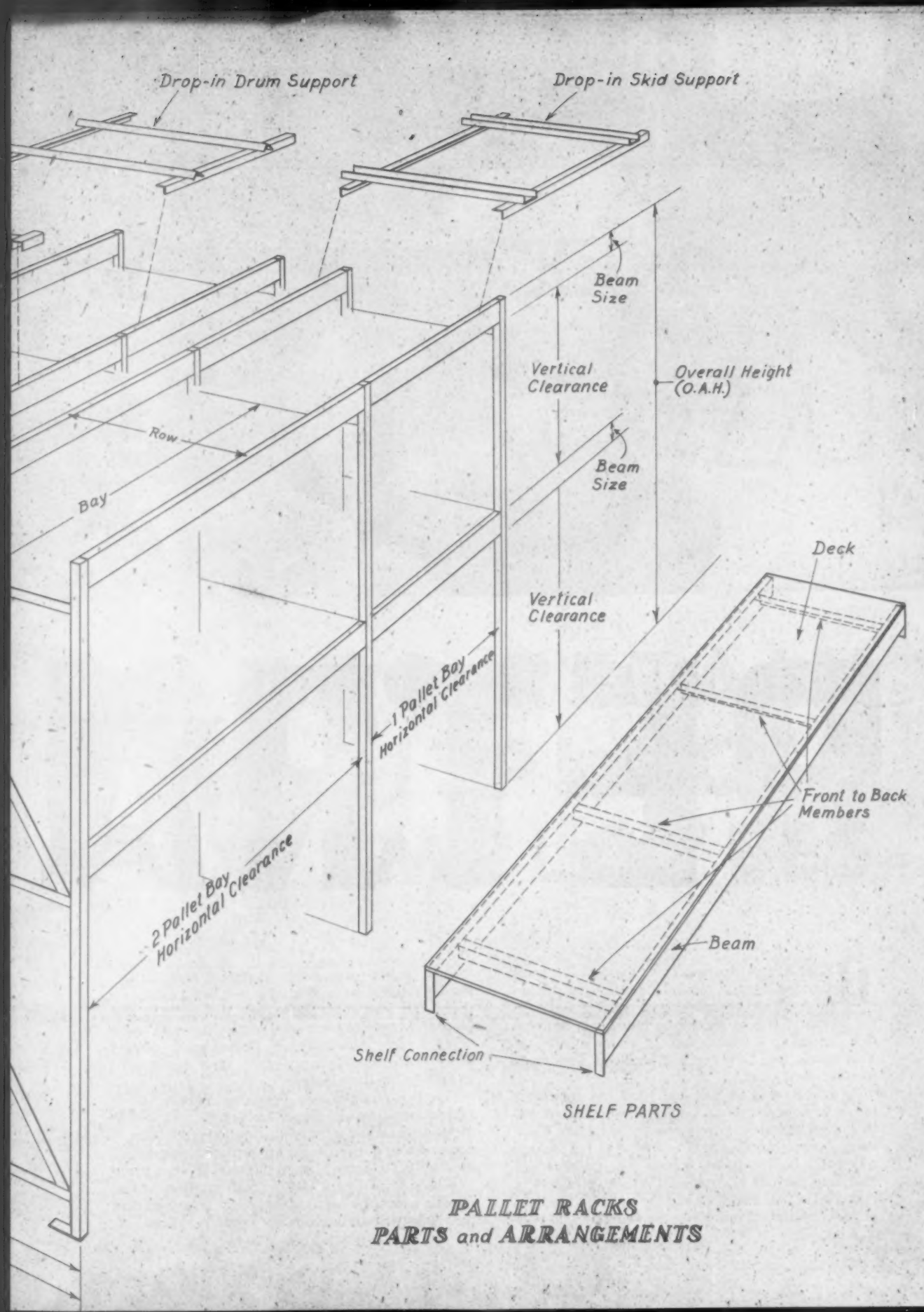
Vertical clearance—Distance from floor to under part of shelf.

ARRANGEMENTS

Back-to-back—Two single racks, one directly behind the other.

Row of racks—Continuously connected racks.





PALLET RACKS
PARTS and ARRANGEMENTS

RETRA

Haloid Xerox (Rochester, N. Y.) doesn't regard automation as a morbid monster that creates products and breadlines with equal facility. On the contrary, Haloid executives found that automation opened up a mother lode of scarce machinists. This article tells how two big problems were made to solve *each other:*

"Automation is all well and good, but something has to be done to protect the people who are affected by technological improvements." Abraham Chatman, a conscientious union official, was not making a demand, he was stating a fact. The problem had also been gnawing at Joseph C. Wilson, president of Haloid. The two men reviewed the situation together. Haloid's traditional business—photographic and photocopy papers—was facing increasing competition. Partial automation to pare costs was being forced on them. But what about the workers that might be displaced? Many had been loyal employees—and members of the Amalgamated Photographic Supply Workers Union—for many years. Both men wanted to hold on to these people.

Another problem was bothering Wilson. Since Haloid introduced its line of xerography machines in 1950, demand had consistently dwarfed production. If demand continued to build up, a painful shortage of machinists and assemblers would soon be upon them.

Wilson took a hard look at both problems, came up with a tentative solution that might set a precedent for industries throughout the country: Send se-

"We recognize our obligation to senior workers threatened by technological change. Through our retraining experiment, we have been able to retain valuable people of proven ability."
JOSEPH C. WILSON, President of Haloid Xerox.

TO RETAIN DISPLACED EMPLOYEES

lected men from the paper-sensitizing operation back to school at company expense, train them as machinists, and transfer them into the machine manufacturing operations as needed.

The plan was outlined to the entire work force, which accepted it enthusiastically. Then the industrial relations department worked out the details.

Officially, the program is still on an experimental basis, but Haloid is pleased with the results so far, and is going ahead with subsequent classes. Of the 72 eligible employees, 45 had applied for the course by the time the first 12 were selected. If all 72 take the course, Haloid figures the cost could run to $150,000. High? Sure, but have you tried to hire a roomful of well-trained machinists lately? And remember that these are *proven* employees. Subtract the costs of laying off those loyal men with proper compensation, and the training figure shrinks. Now consider the value of high morale, confident employees, good community relations, and the trust and cooperation of the union. In perspective, this is not an extravagant program.

Union jurisdictional disputes do not arise, since all Haloid employees are represented by the same union. Other factors that helped make the plan workable: an expanding company with enough diversity to absorb the retrained men, proximity of a good technical school, a history of favorable union-company relations, and alert responsible management.

Turn the page

. . . RETRAIN TO RETAIN

Some jobs in the photographic division at Haloid, such as hand mixing photographic emulsions (1), were forced into automation by aggressive competition. The six-week retraining program shunts these men into skilled jobs in other parts of the plant. Qualifications for retraining include 10 years' service and a willingness to participate. Also, each employee must be able to offer at least 10 more years of service.

Handling rolls of raw-stock paper in storerooms (2) is typical of the jobs formerly held by men now being retrained. Promotional and earning potentials were severely limited. Retrained men transfer to the rapidly expanding xerography division.

Retraining begins at Rochester Institute of Technology (RIT) with sessions in shop theory (3) taught by professional instructors. Haloid pays full tuition, wages, and administrative costs. During each of the first two weeks, the men put in two days of straight machine-shop theory.

There's individual instruction, too (4). Christopher Oliver (left) is on his way to becoming a skilled machinist under the guidance of Kenneth Hood (right) of RIT. Oliver has new opportunities to advance and earn more money. Developing new skills has been hard, but diligence and enthusiasm have overcome all obstacles.

In the school shop (5) each trainee proves in practice what he learns in class. In the final two weeks, the class is split into two sections. The company makes the choice, based on aptitudes demonstrated thus far. Six men take advanced machining, the rest learn mechanical assembly.

One of the latter, Robert Freeman, combines the six basic parts of a Xerox office copying machine (6). Since training, he has been improving progressively at his new job.

Relocation begins immediately after training pending suitable openings in machine manufacturing. Four of the first 12 trainees were put on machines right away. Joseph Froman (7) was one of these. Result: He is nonchalantly using an electron drill to cut a broken tap from the frame of a xerography machine. Like most of the others, Froman found math the hardest part of the course. But he, too, set his jaw and mastered it. Homework? You bet there was!

Seniority is retained in the old areas and, upon assignment to machine manufacturing, the men begin building seniority there. Company seniority is unaffected.

A former quality-control man who is now a drill press operator (8) Chester Staub is so enthusiastic about his new job that he's taking night courses in machine-shop theory on his own.

Counting lost production time and all, it costs less than $2000 to train each man—less than to lay off proven employees in the paper operation and then hire unknown machinists off the street. Bonuses: top-notch morale, solid labor and community relations.

1

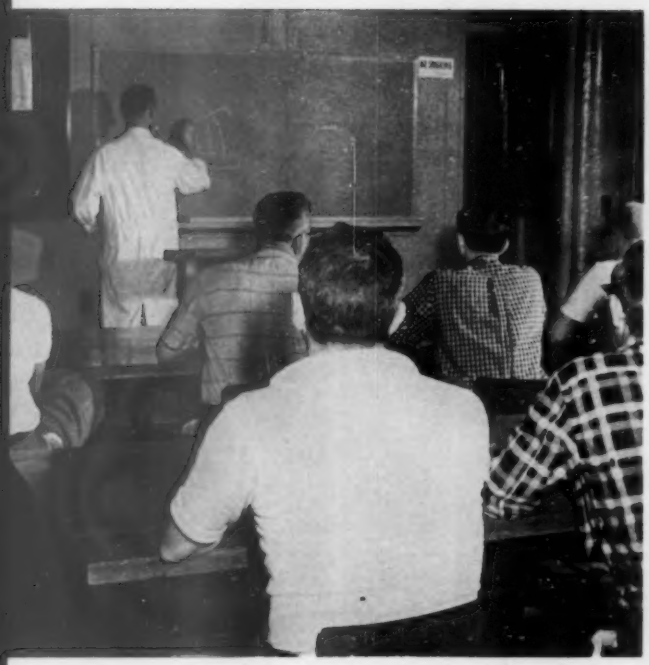
2

WHEN JOBS LIKE THESE ARE ABSORBED BY AUTOMATION . . .

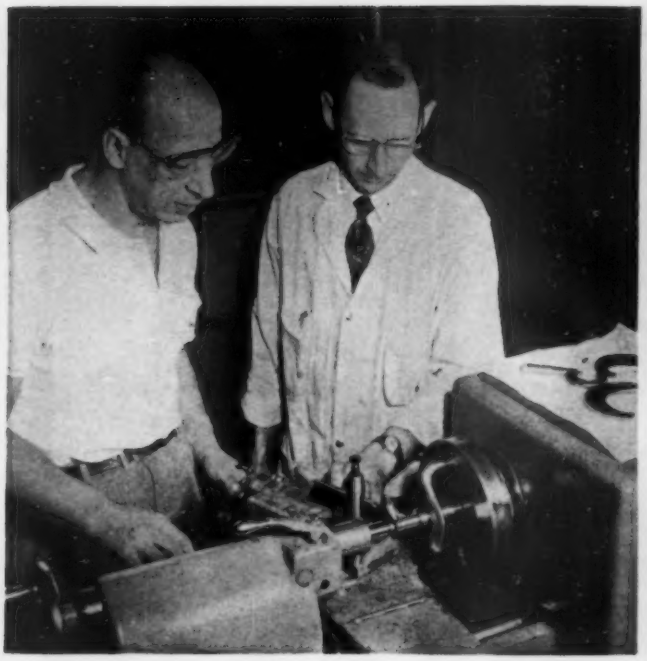
5

6

ON-THE-JOB TRAINING TIES IN WITH CLASSROOM WORK . . .

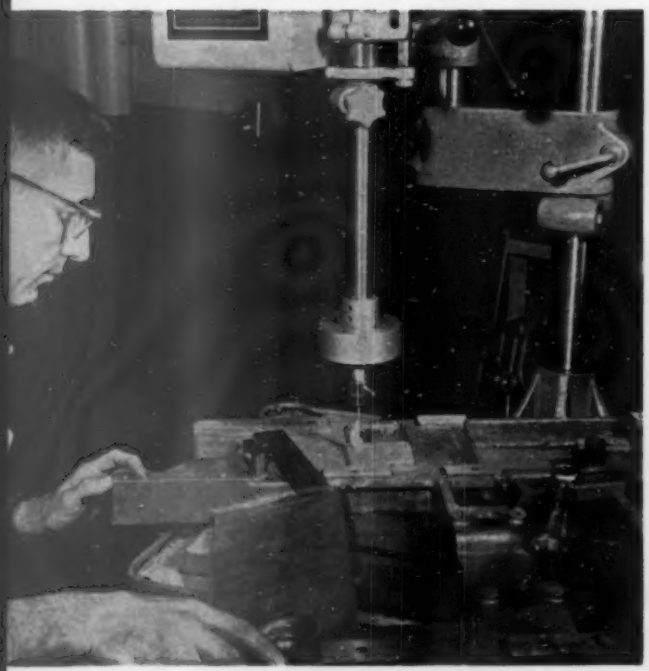


3

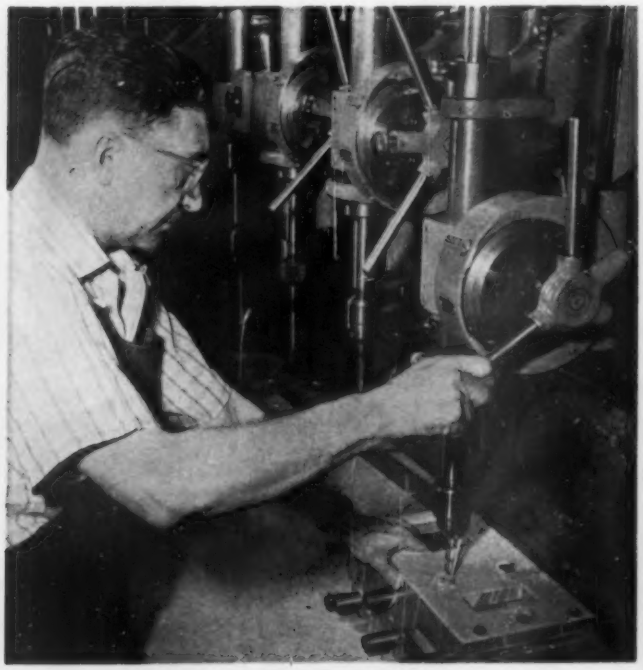


4

HALOID XEROX SENDS LOYAL WORKERS AWAY TO SCHOOL TO LEARN NEW SKILLS . . .

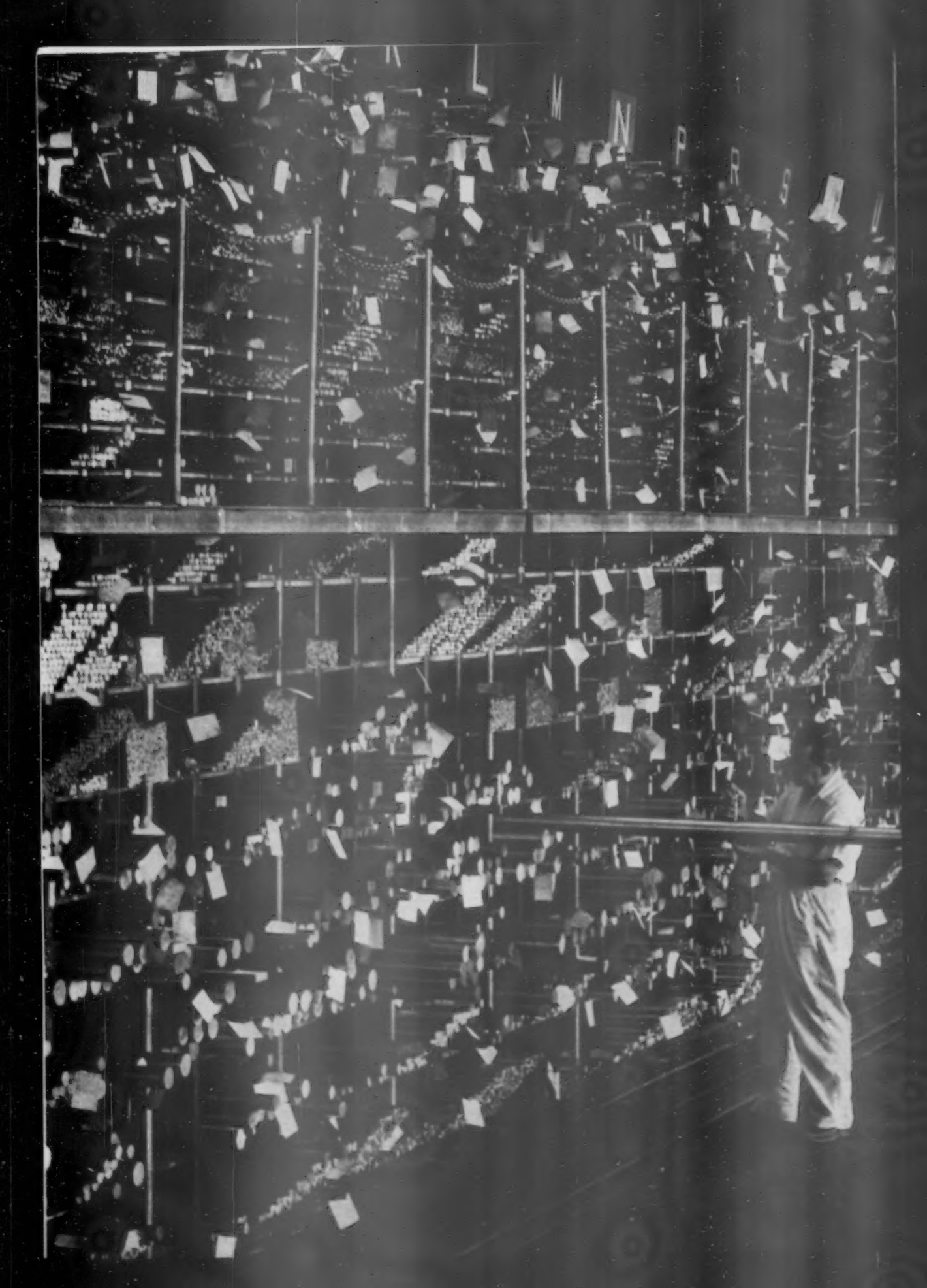


7



8

TO SUPPLY VITALLY NEEDED CRAFTSMEN FOR OTHER DEPARTMENTS IN THE PLANT.



BY LUTHER MILLER
Carpenter Steel Company
Reading, Pa.

A merchant's method: PROFIT CONTROL for plant inventory

You can apply the retailer's method of inventory control to your plant's finished goods. We're doing it successfully at Carpenter Steel, where we stock over 4000 items in 20 warehouses throughout the U.S. Our average sale is a few hundred pounds of specialty steel for tooling or other needs.

Results: (1) Management can count on the rate of return on items, thus stock more realistic supplies. (2) We have a sensible, uniform system for varying the amount of our finished goods inventory to meet increased business activity or need for dollars elsewhere in the business. (3) We get inventory reports in terms of return on investment—a concept we're used to working with.

Merchants link inventory and profit

Says Max Hess, President of Hess's Department Store, Allentown, Pa. (and author of the book, *Every Dollar Counts*): "We can't afford to have a slow moving stock of low profit items. If profit is small, the item must sustain itself on volume. Naturally, we can afford to inventory some higher profit items for a somewhat longer time. The point is, we in retailing take a long, hard look at every item to make sure it turns over according to its profit. And we see no reason why this same concept could not be applied to industrial finished goods inventories."

Merchants move low profit items fastest

Among retailers, the ratio of stocks to sales is an important measure of activity—and success. So important that monthly reports of the ratio of stocks to sales are made for the Board of Governors of the Federal Reserve System. One recent report shows that department stores carry an average of 3.6 items per sale. Bargain stores (where profit is lower) carry only 2.4 items. As a ratio of sales, then, bargain stores carry a smaller inventory than department stores.

It costs money to stock materials or goods—money that could otherwise be invested in profit-producing activities. The longer an item is in stock, the greater the cost. And for low profit items, time in stock can make the difference between turning a profit or suffering a loss.

In a department store, the cost of inventory is the sum of handling costs, cost of providing and maintaining floor space, loss of return on dollars tied up in the inventory, cost of insurance, taxes, and depreciation. These costs apply to industrial inventories, too.

Merchants use profit as an inventory benchmark

A retailer knows that seasonal variations in sales, the general level of consumer buying, the fads of the moment, and dozens of other considerations affect the amount of inventory of any item. But he always keeps the profitability of the item in the back of his mind as a benchmark for his buying decisions. And when any item has overstayed its time in stock—especially a low profit item—he has a sale to clear it out. He knows that time in inventory nibbles away at profit. So he often takes a small loss on some items to keep his over-all profit high.

Turn the page

How ROI works to control inventory

The chart below is the key to our control of inventory of any item or group of items in stock. It reflects a procedure we've had in effect for several years. The chart shown here is not taken directly from our files because we prefer to keep our profit figures to ourselves. However, the chart is accurate in principle.

In our system, we balance our inventory based on expected Return On Investment (ROI), just as the retailers do. Each of our manufactured items has profit applied to its total cost. The number of times we can expect to turn over the item within a given period (we use one year as a base) determines our ROI. For example, an item with 10% profit applied to its cost must turn over five times a year to produce a 50% ROI. An item with a 20% profit needs only to turn over 2.5 times per year to produce the same

A sample of inventory control

Grade	Profitability Factor	Desirable Turnover	Actual Annual Turnover (Average)	Warehouse A	Warehouse B	Warehouse C	Warehouse D
Group A							
A-1	13.1		8.5	7.2	9.4	9.0	8.6
A-2	12.3		3.8	3.8	4.0	3.8	3.6
A-3	11.8		5.7	3.9	6.2	6.8	5.8
A-4	14.0		4.2	4.6	3.4	4.6	4.2
A-5	11.7		3.8	2.2	4.4	4.8	3.8
A-6	12.8	4.	3.3	2.4	3.4	3.2	4.2
A-7	11.5		3.2	2.2	3.8	3.4	3.2
A-8	11.3		1.5	—	.26	2.8	—
A-9	13.4		7.8	9.0	7.6	7.0	7.8
A-10	14.1		9.1	10.2	5.6	9.8	10.8
A-11	12.5		6.4	8.6	4.4	—	6.2
Group B							
B-1	9.8		5.2	4.8	5.3	5.3	5.3
B-2	11.0		4.1	5.8	2.8	4.8	2.8
B-3	10.0		3.3	—	2.0	5.3	2.6
B-4	10.2	4.9	2.7	3.4	2.8	3.0	1.6
B-5	10.6		3.3	—	2.3	6.0	1.7

ROI. We don't refine our control to the point of separately evaluating every item, but we apply the principle to groups of products in our finished goods inventory. Here's our four-step procedure:

1. We arranged our 4000-odd finished goods inventory items into reasonably homogeneous sub-groups. A particular grade of tool steel, for example, forms a sub-group in the same way round-collar, French-cuff shirts form a sub-group regardless of neck size and sleeve length. We have arranged all our items into 65 sub-groups.

2. To determine the average profitability of each of the 65 sub-groups, we compared cost figures and sales figures for every item in every group, then averaged the profit for all items in each group.

3. We ranked the sub-groups by profitability, then made a further division into natural main groups. The chart at left demonstrates this point. (In the chart, profit is converted into a "profitability factor" to disguise actual profit.) Divisions between the groups were made where natural breaks occurred in the profitability of the sub-groups. For each group, we established a desirable turnover rate. In the example these rates are 4 and 4.9.

4. We made up a ledger, similar to the example at left, to compare our finished goods inventory turnover with the desirable turnover rate. A separate study was made at every warehouse. Each item that varied markedly from the desirable turnover rate was carefully evaluated. Result of the study: We shifted material around in our warehouses to reduce overages and beef up shortages. And the study affected our schedules for subsequent production runs—postponed some, speeded others.

Control is by groups, not items

Now we use the profitability data as a control on finished goods inventory. When any item is sold from stock, our records show the reduction.

Provided the sale is large enough, we re-order the item from our production departments. (If the sale is small, we wait and accumulate our inventory reductions until we can re-order the lot size of the average sale.) We also consider mill lead time and mill production minimums (smallest economic lot size for mill production) in re-ordering items for finished goods inventory stock at warehouse locations.

We balance our inventory daily. And every four months we recap our inventory position for each of the 65 major groups. If the actual turnover for the group as a whole varies from the desirable turnover by too large a margin, we take action to bring it into line. For example, we may move back our production schedules. Individual items in the groups may, of course, vary greatly from the group average turnover, based on the factors of lead time, average lot size sold, sale history, and mill minimum.

Needed: management decisiveness

It's the most important ingredient in our system. Without a decisive management opinion on the proper ROI for inventories, the method cannot be applied. There's no reason to keep the plant's total ROI at a constant level, either. To do so ignores one of the major benefits of the system.

Our management establishes different ROIs as often as every few months, although the usual procedure is to re-evaluate our position twice a year. In establishing the desirable ROI, we consider sales forecasts for the market as a whole (not for individual items) and other factors, such as the company's need for capital for other purposes. If the decision calls for reducing inventories, we do it across the board, using our control procedures as before. The only change involved is in the desirable turnover rate, based on the lower inventory levels.

Management's payback: inventory control in terms it can understand—return on investment.

PAY RATES FOR KEY INDIRECT JOBS — IN 9 CITIES

All figures are average straight-time earnings in manufacturing industries except figures with asterisk, which are for all industries. They include incentive pay, if any, but not overtime, weekend, holiday, or night-shift premium.

Weekly earnings are average salaries for standard work week.

	DETROIT JAN. '60	INDIANAPOLIS JAN. '60	JACKSON FEB. '60	KANSAS CITY JAN. '60	MEMPHIS JAN. '60	NEWARK and JERSEY CITY FEB. '60	RICHMOND FEB. '60	SAN FRANCISCO-OAKLAND JAN. '60	WASHINGTON, DC DEC. '59
MALE JOBS, EXCEPT WHERE OTHERWISE SHOWN									
MAINTENANCE AND POWERPLANT: Average straight-time hourly earnings									
Carpenters, maintenance	$3.01	$2.81	——	$2.79	$2.14	$2.75	$2.57	$2.98	$2.62*
Electricians, maintenance	3.16	2.95	2.44	2.94	2.68	2.92	2.78	3.09	2.59*
Engineers, stationary	3.17	2.80	2.07*	2.94	2.61	3.13	2.31	3.16	2.70*
Firemen, stationary boiler	2.65	2.25	——	2.23	1.42	2.51	1.76	2.71	1.73*
Helpers, trades, maintenance	2.46	2.27	——	2.44	1.62	2.16	1.89	2.55	1.99*
Machinists, maintenance	3.17	3.03	2.44	2.91	2.57	2.95	2.78	3.10	2.70*
Mechanics, automotive, maintenance	2.93	2.37	2.13*	2.61	1.99	2.90	2.04	3.04	2.12
Mechanics, maintenance	3.13	2.87	2.14	2.70	2.35	2.83	2.63	3.06	2.70*
Millwrights	3.10	2.93	——	3.02	2.67	2.84	——	——	——
Oilers	2.55	2.56	——	2.30	2.05	2.33	1.91	2.51	——
Painters, maintenance	2.95	2.64	——	2.77	2.39	2.59	2.65	2.97	2.21*
Pipefitters, maintenance	3.08	2.94	——	2.97	2.83	2.90	2.86	2.96	2.66*
Sheet-metal workers, maintenance	3.08	2.99	——	2.91	——	2.90	2.88	2.93	——
Tool and die makers	3.28	3.08	——	3.02	2.84	3.00	——	3.47	——
CUSTODIAL AND MATERIAL MOVEMENT: Average straight-time hourly earnings									
Guards	2.59	2.38	——	2.43	2.16	——	2.23*	2.41	1.68*
Janitors, porters, and cleaners	2.27	1.92	1.29	1.97	1.44	1.98	1.53	2.24	1.44
Janitors, porters, and cleaners (women)	2.03	1.97	.80*	1.52	1.26	1.71	1.16	2.06	1.14*
Laborers, material handling	2.37	2.02	1.21	2.09	1.44	2.33	1.48	2.38	1.81
Order fillers	2.48	2.05	1.22*	2.23	1.69	2.24	1.79	2.56	1.86*
Packers, shipping	2.33	2.00	——	2.06	1.71	2.01	1.40	2.34	1.41*
Packers, shipping (women)	2.26	1.28*	——	1.57	——	1.71	——	1.71*	——
Shipping clerks	2.61	2.31	1.84*	2.19	1.88	2.23	1.96	2.59	2.00*
Shipping and receiving clerks	2.50	2.30*	2.24	2.43	1.71	2.35	1.95	2.59	2.01*
Truckdrivers, light (under 1½ tons)	2.50	1.97	1.07*	1.95	1.52	2.19	1.35*	2.81	1.79
Truckdrivers, medium (1½ to and including 4 tons)	2.62	2.11	1.46*	2.40	1.66	3.21	1.58	2.89	1.97
Truckers, power (forklift)	2.45	2.22	1.30	2.39	1.69	2.35	1.63	2.49	1.72*
Truckers, power (other than forklift)	2.53*	2.25	——	2.38	2.26	2.14	——	2.71	——
Watchmen	2.05	1.43	1.25	1.71	1.15	1.91	1.63	2.22	1.29*
FEMALE JOBS, EXCEPT WHERE OTHERWISE SHOWN									
OFFICE, PROFESSIONAL AND TECHNICAL: Average straight-time weekly earnings									
Comptometer operators	87.50	75.50	53.50*	75.00	70.00	76.00	62.00	82.00	69.00
Draftsmen, senior (men)	141.50	126.00	93.50*	113.00	118.00	113.00	120.50	121.00	108.00
Draftsmen, junior (men)	100.50	93.00	64.50*	93.00	75.50	86.00	87.00	97.00	77.00
Duplicating-machine operators	74.50	64.50	——	58.50*	56.00*	61.00*	——	73.50	65.50*
Key-punch operators	89.50	76.50	57.50*	71.00	69.50	71.50	75.00	77.50	72.50
Nurses, industrial (registered)	103.00	99.00	——	92.50	83.50*	91.50	97.50	97.50	86.00*
Office girls	74.50	57.00*	——	49.50*	50.00*	60.00	52.00*	65.50	52.50*
Payroll clerks	91.00	81.50	66.50*	71.00	65.00	76.00	72.00	89.00	75.50*
Secretaries	106.00	98.50	70.50	89.50	74.00	89.50	86.50	95.50	86.00
Stenographers, general	92.50	87.00	57.00	78.00	66.50	76.00	75.00	85.00	75.50*
Typists, class A	91.00	78.50	56.00*	78.00	71.00	71.50	70.00	82.50	64.50
Typists, class B	77.00	64.50	52.00*	60.50	50.50	63.00	55.50	70.00	66.00

Indirect labor costs rise in 9 more cities

Continuing its exclusive reports on indirect labor costs, FACTORY offers its third set of data this year (see April issue, page 110; June, page 100). Nine more representative cities are covered in the above figures supplied by the U. S. Department of Labor's Bureau of Labor Statistics.

You can use these figures to compare your costs with the average in your vicinity. Or to analyze your operations. For instance, you might check to see if you're paying for more talent than you need (Class A typists when Class B would do, or senior instead of junior draftsmen). Look at the salaries above, and you'll see that this kind of organizational soul-searching can pay off!

Imagination—the missing link in plant design

An editorial commentary

BY OSWALD STEWART
BUILDINGS EDITOR, FACTORY

Oz Stewart has been FACTORY's industrial buildings sage since 1956. Before coming to FACTORY he was Superintendent of Maintenance and Construction at Dewey and Almy Chemical Division of W. R. Grace & Company. A registered professional engineer, Oz holds a mechanical engineering degree from MIT.

Too many new plants we've seen during the past few years resemble the product of an architect's drawing resurrected from a dusty shelf. With each year bringing improvements in building materials, concepts, and techniques, outmoded plant design just doesn't make sense.

You wouldn't think of walking into an automobile showroom and buying a five-year-old model that for some inane reason had been carefully mothballed. Even if this "brand-new car" didn't have a single mile registered on the odometer, you'd prefer a current model with its intrinsic advances in engineering and design. Then why "buy" old style when building a new plant? Why be satisfied with a plant that looks five years old as soon as the last brick is laid?

Here's a horrible example: FACTORY has received presentations regularly in the last few years from a contender—a nationally known company—in our annual Ten Top Plants competition. The plans and appearance of each of its "new" plants look just about the same as one built by the same company in the New England area shortly after World War II. No progressive thinking here.

The same amount of money—perhaps even less—could have produced sparkling new plants that were really abreast—or even ahead of the times. What's the return on this kind of thinking? Plenty, in terms of higher morale, higher caliber of employee, higher productivity, and better community relations.

To illustrate the point of appeal and payoff, let's look at a significant non-industrial example. Roadside eating places in the past 15 years since World War II have taken tremendous strides forward in exterior appearance and interior furnishings. Why? It's simple. People faced with a choice of two places to eat will be more likely to choose the one that is bright and inviting with gleaming glass, pastel colors, and tasteful landscaping.

An increasing number of industrial companies are following suit, and are creating facilities that employees are obviously proud to work in. Many of these plants, in fact, have been awarded honors in our annual Ten Top Plants competition. Visiting them, you can sense a feeling of pride and pleasure among the employees that contrasts sharply with the "this-is-just-another-job" attitude of people in outmoded plants.

One of this year's winners, Flick-Reedy of Bensenville, Ill. (FACTORY, May 1960), is a fine example of an imaginatively designed plant. Construction costs were amazingly low ($10 per square foot) for the outstanding buildings and extra services—such as an in-plant swimming pool that doubles for fire protection. The building is extremely attractive inside and out, and its layout has paid off in far greater productivity than was possible in the former plant.

Indeed, it can be done. Plants can be built to encourage higher production at no sacrifice to aesthetic and human value. You can do it by taking these steps when thinking about a new plant:

- Select an inspired architect and a progressive engineer.
- Don't accept the conventional way of doing things just for the sake of conservatism.
- Don't be afraid to venture ahead with imaginative new ideas. What you think "daring" at first may seem ordinary after a while. Then you'll wish you had gone even further.
- Explore improved materials and designs in other fields, such as commercial, educational, residential, etc.
- Select the best in other plants from published material and by follow-up visits. A few dollars of travel money and time now can yield unexpected dividends later.
- Put your suppliers and distributors to work. Get them to produce the very latest in their fields.

A

FACTORY

ENGINEERING AND TECHNOLOGY REPORT

PRODUCTION PAINTING

NO. 6

PAINTING
PAINTING
PAINTING

tunnel of separate chambers encloses a conveyor. As the parts proceed at 10 feet per minute, they are automatically sprayed to cover all surfaces in six steps:

1. Alkali cleaner at 150 F. (degreaser).
2. Water rinse at 140 F. (alkali and sludge removal).
3. Second water rinse at 140 F. (ditto stage 2).
4. Phosphate with 0.5% sodium nitrate at 135 F. (adherence promoter).
5. Water rinse at 70 F. (excess phosphate removal).
6. Chromic acid dilution at 140 F. (rust prevention).

This treatment is used for high-quality finishes on kitchen equipment, office furniture, office partitions, or passenger car bodies.

Each liquid stage for an average line moving at, say, 10 fpm. costs $12,000 installed. Higher production requires greater speed—which takes larger and costlier tanks and sprayers.

AUTO BODIES are dipped 18 inches into 9000 gallons of undercoat primer with no fire hazard. Chrysler of Canada, Limited, dips cars into a water-base paint, which is then baked to permanent finish.

DIPPING

Dipping is the simplest method of painting. The product is manually or automatically dipped into a container of paint, and excess paint drips into the container, or a salvage tank, before the product is dried. Controls of paint recirculation and temperature are critical.

Advantages and disadvantages

Dipped products are subject to runs, hence dipping is often used for prime coats, small interior brackets not seen in the finished product, or industrial rust prevention. But it is rarely applicable for high-quality finish coats on large pieces. "Container" shapes are poor subjects for dip treatment. They either float or get filled.

For large items, weight of the dip tank and its associated circulating and temperature control equipment is a major consideration. This loading often forces the location of the paint dip area to a lower floor. This placement can be awkward in multi-story buildings where the paint bake oven with its hot exhaust is best located on the roof. Water-soluble paints containing no alcohol, oils, or naphtha overcome the fire hazard, but they're still heavy, and floor loading is still a drawback.

Some dip tanks are movable. The item moves along on a conveyor, and tanks are raised under the moving line, move with it, descend, move back, and repeat the operation. Other tanks, each with a different color, can be interchanged under a conveyor. Or, of course, conveyors can be switched to various tracks.

Dipping requires drip-draining. When solvents are especially volatile, a vapor enclosure is needed to permit the product to drip before it enters the air. Vapor enclosure floors are often sloped toward the tank, and some drippings are recovered. Still better is an arrangement where the product moves slowly over the dip tank as it rises out of it. Then the surface tension of the liquid in the dip tank acts with a wiping action to remove most of what would otherwise drip. With this wiping effect, the sloped aprons are not eliminated, but more paint and solvent are recovered with controlled withdrawal. Withdrawal rate and paint temperature are interdependent and both must be precisely regulated.

Turn the page

PAINTING
PAINTING
PAINTING

HAND SPRAY, useful for painting short runs or large, odd-shaped pieces, is used in a dry booth at a John J. Nesbitt plant. A second booth, in the rear, is used to spray the other side of the units.

SPRAYING

Spray painting is the most versatile and widely used industrial painting process. The paint is usually carried in a stream of air or steam. Some units pressurize the paint (which can be hot or at room temperature), and discharge it through a tiny aperture to atomize it.

Advantages and disadvantages

Spray techniques can be applied to light or dense coating materials. Equipment can be obtained to spray lacquers or 30-lb.-to-the-gal. red lead paints. Viscosities range from "water" epoxies to sticky mastics. Both hand and automatic equipment is available.

The process has no great drawbacks in engineering or technology, but the other methods are often more economical for specialized applications.

To provide clean air in the spray booth, a system of ventilation is a must. Dry-wall and water-wash are both popular. The water-wash system uses a curtain of continuously flowing recirculating water on the back and sometimes on the sides of the booth. Air from the booth is drawn through the splashing water curtain and exhausted. The water picks up the overspray, which is filtered out during the recirculation process. The air supply to the booth is often the warm room air, which becomes a major consideration in winter. Winter or summer, the air must be replaced. Since a small, one-man booth might require 4000 cfm. of air, it is obvious that without adequate make-up air the paint room would soon be operating in a vacuum. Defects caused by dust are often eliminated with an excess of clean make-up air.

The dry-type booth tends to be cheaper than the wet, but it permits paint build-up in the exhaust system. For heavy production runs a wet booth is more popular, but where the load is light or intermittent, a dry system of filters and baffles is considered adequate. This part of industrial ventilation is closely controlled by municipal and state government agencies. Frequently, the choice of booth is actually dictated by these health, fire, or air pollution authorities.

The current trend seems to be to use hand spray for touch-up after electrostatic painting and for finish coats on areas and shapes that don't lend themselves to other processes.

An 8-ft. ventilated booth and a 5-hp. compressor unit, tank, reducing valves, hose and fire protection equipment cost $3500. With these, one man can handle 1000 square feet of flat work a day—less on small irregular shapes, more if the item is conveyorized.

At the management level, spray painting should be viewed as the first approach for versatility and low capital investment. But remember: Spraying is coupled with high labor cost and relatively poor paint "mileage." For example, consider General Water Heater Corporation in Burbank, Calif. It covered 370 square feet per gallon with hand spray. By comparison, it now covers 610 square feet per gallon using electrostatic equipment.

On the other side of the ledger, it must be remembered that the versatility of a spray gun is without peer. Any paint can be applied to practically any surface. Changes in product size or shape or color are easily compensated for. Short runs, touch-up, specialty decoration, art work—these are the forte of hand spraying today.

Example: Whirlpool Corporation uses a wet-wash booth for one of its hand-spray operations. It recovers the overspray floating on the water in the booth, sells it to a paint reclaimer who disperses it in solvents, thus making a good thing out of a waste material.

Turn the page

HIGH-SPEED DISK (left) rotates as it reciprocates vertically, electrostatically spraying radiator covers at John J. Nesbitt. Two men (right) then touch up. This combination of methods is common.

ELECTROSTATIC SPRAY

Electrostatic spray painting is the newest painting technique. Using automatic spray heads, it is popular for painting products made continuously or in high-volume lots. It is automatic, needs no operator. Labor costs here are limited to loading and unloading parts conveyors, and to hand-spray touch-up when needed. A more recent development in electrostatic spray painting is the hand gun. More versatile than the automatic equipment, it extends the method to a wider variety of products and to small job lots.

With the automatic method, paint is atomized under the combined influence of a disk or cone rotating at 900 to 3600 rpm. and a high-voltage electrostatic field that gives paint particles an electric charge opposite in polarity to the product to be painted. The schoolboy axiom says "unlike charges attract each other," and this is what does the trick. The electrical attraction is so strong that the paint particles need not be aimed directly at the surface to get there. They will wrap around a curved surface.

Advantages and disadvantages

One great advantage of electrostatic painting is its reduction of paint loss. Almost all of the paint is deposited on the product through this technique. In conventional hand spraying, 40 to 50% paint utilization is considered normal. Compared with flow-coat and dip processes, electrostatic painting saves paint by reducing excess paint thickness on the product. Also, the electrostatic process does not waste paint on interior surfaces that don't require paint. Automatic operation cuts labor costs.

Although electrostatic deposition is excellent for automatic painting of flat surfaces, it is not the be-all and end-all of production painting. Irregular shapes cause the paint to build up on projections and sometimes miss valleys. Often air hand spray is used to pick up missed areas.

Safety note: Underwriters don't consider the high voltage used in this method an unusual fire or health risk. Insurance rates here are in keeping with other techniques in the industry. Some local codes require a variance for this installation, but electrostatic painting can be legally operated if the design is first cleared with municipal authorities.

Example: John J. Nesbitt, Inc., Philadelphia, uses an automatic electrostatic painting line (which moves at 11 feet per minute) for the large flat sections of its heating, ventilating, and air-conditioning equipment. It favors this method for long runs. Flat surfaces lend themselves ideally to the system. Where the surface has a bend or turned edge, Nesbitt still uses this method, but sometimes follows it with a hand-spray touch-up. This company matches the colors, regardless of the process, by using the same paint throughout the plant and then adjusting only the solvents. This gives the viscosity and drying characteristics that the method requires for hand-spray, electrostatic, or dip lines.

MISCELLANEOUS APPLICATIONS

Probably 95% of industrial production painting jobs today are solved with hand spray, automatic spray, electrostatic, flow coat, or dipping. The remaining 5% are handled by a baker's dozen of highly specialized applications. Among this group are:

Silk screen—This technique is fine for printing designs with paint. The screen is blanked out where no paint is desired, then a brush or squeegee pushes the pigment through the unblocked screen openings.

Decalcomania—Paint decorations are prepared on a base they don't stick to. When dry, they are lacquered or varnished to the product. Decals are popular for labels.

Squeegee or roller—This paint transfer is one step up in evolution from a paint brush. The roller picks up paint from the container or from another roller and deposits it on the product by contact. Good for decorative trim and novelty effects. The roller is also used in high-speed production painting of coiled material; it paints only one side.

Spin-coating and barrel-tumble—First a dip and then a spin in a barrel to throw off the excess paint. Popular for small, odd shapes with deep inaccessible sections.

Brush—Still used, this is the granddaddy. Hand painting today is mostly for decoration in the houseware, novelty, and toy industries.

SOLVENT REMOVAL AND BAKING

Once the paint is on the surface, regardless of how it got there, it's essential that the solvents be removed.

When paint is applied to a metal surface by spray, only 12 to 35% of it is solid. The remaining 65 to 88% is volatile and must be removed by evaporation in the booth, by flash-off between the booth and oven, or in the oven itself. For many paints in use today, 200 F. is enough for solvent evaporation. When the paint is a thermoplastic that simply sets up when solvents are removed, this 200 F. treatment is sufficient. When the solids in the paint are thermosetting and require heat to cause a chemical change, the first 200 F. drives off the solvent, but the final heat treatment required for polymerization is often about 350 F. for 20 or 30 minutes.

Ovens today are often located on plant roofs. This saves floor space and also reduces the heat and fume-removal problem. In multi-story buildings, it forces the entire painting operation to the upper floor.

PRIMER ON SAFETY

• **Most of the dangerous paint solvents have a distinctive odor.** If they don't, it sometimes pays to put a stench-producing agent in them. Then a defect in the ventilating system or a leak in a line becomes apparent before the concentration reaches dangerous levels. Another factor that keeps paint handling safe is the insurance underwriter. These insurance people are experts, and their advice (coupled with their power to cancel a policy or raise premiums) keeps the painting industry healthy.

• **Some solvents cause skin diseases.** Industrial hygiene experts report that dermatitis comprises over half of all illnesses of occupational origin. Protective clothing and protective creams are in the special bailiwick of these medical experts. Their advice is free, and their unbiased knowledge, especially about skin creams, can save money in premiums and reduce time off for medical treatment for skin disorders. If the paint composition or solvent formula is changed, someone who was previously unaffected might break out in a rash. Plant medical people should be kept informed when formulas are changed. Such changes may affect diabetics, alcoholics, heavy drinkers, and workers with bad livers. A worker may thrive while working with, say, a varnish makers' and painters' (V.M.&P.) naphtha, but may become sick if even a small quantity of alcohol or glycol is used. (In other cases the reverse might be true.)

• **Fire hazard from sparks may be remote during a humid period.** When the air is damp the electrostatic charges bleed into the moist air or ground; but in dry weather they can touch off a blaze. If the ventilation or air conditioning is changed in the paint area, notify a competent expert and get his advice.

• **Fire exits from paint-working areas are required by law.** One point sometimes overlooked is that, subconsciously, a worker who feels safe works better. Secondary exits from closed hand-spray areas are good morale boosters.

1. Sharper manufacturing organization

2. Tighter

Three-way modernization means–

SOLID '60 LIFE FOR A GAY '90s PLANT

In Seeburg Corporation's vintage plant, near the Loop in Chicago, veteran managers like the men you see above are working modern manufacturing miracles.

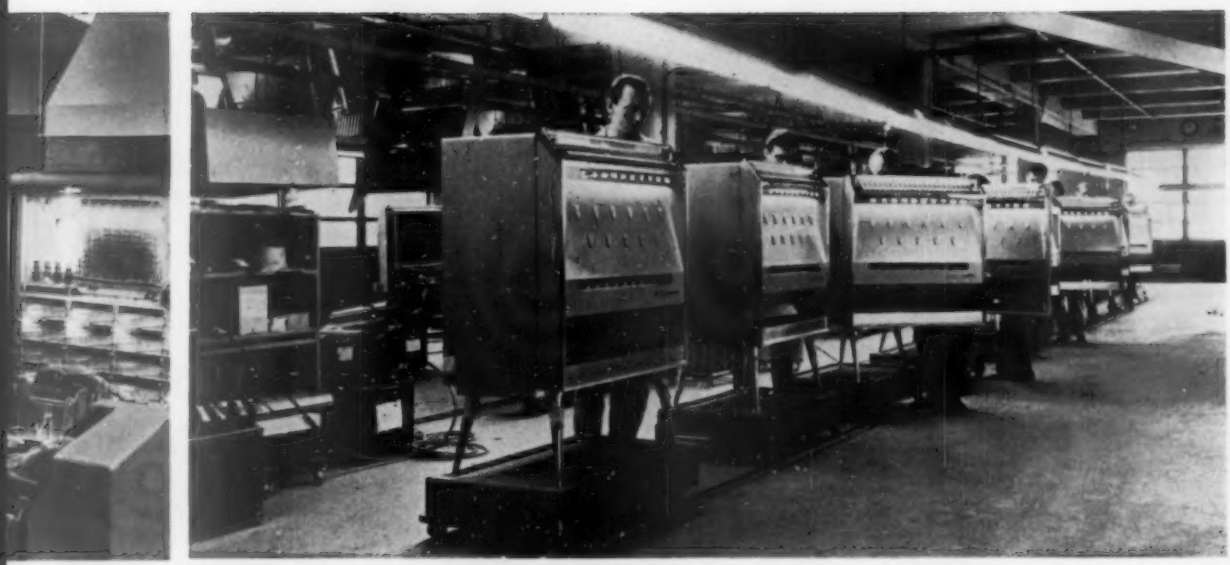
In 1959 these men helped the company triple profits while grossing the same sales dollars as in the previous year. Assembly costs have been cut 21%. And a brand-new conveyor installation has paid back its $39,000 price tag in three months. These are the most impressive demonstrations of their work. Many more examples are outlined on the pages that follow.

As in many success stories, the turning point of Seeburg's rejuvenation is hard to define. It developed from a combination of many factors—some carefully planned, others just happy accidents. But out of the welter of documentation gathered at Seeburg by FACTORY's editors, there are three mainstream courses of action that stand out. In a nutshell, they are:

1. A vigorous reorganization of responsibility among manufacturing managers—illustrated by the elevation of four managers of plant operations to assistant vice presidents (above left).

2. Greatly improved and tightened management controls—simplified by detailed daily cost printouts from a computer (above center).

3. Judicious modernization of production equipment and plant buildings—characterized by the broad, bright supply aisles found in the assembly department (above right).



ontrols

3. More efficient, new facilities

NEW STRENGTH IN ORGANIZATION

The organization chart you see above is strictly hypothetical. Seeburg has no formal organization charts. But Fleming W. Johnson, senior vice president, believes in firm fixing of responsibility. To implement his beliefs, last year he elevated four operations managers (above) to the rank of assistant vice president. There is more responsibility in each title than meets the eye.

To Carlman (fabrication) and Kehoe (assembly) the new titles mean corporate responsibility for costs in their areas of operation. Standards cover over 95% of the nearly 800 employees in their departments. Daily cost budgets are pinned down to the penny. The real task for Kehoe and Carlman: strict conformance to cost and profit objectives.

To Gregory (manufacturing and quality control), the title indicates growing priority for customer demands concerning product quality. His sphere of activity is mainly design engineering and the production shop. Because Seeburg's main products are coin-operated and subject to tough continuous service, reliability demands are unusually high. Consequently, Gregory's small group of employees (12) concentrate on raw material control and on quality assurance. While actual inspection is under the supervision of Carlman and Kehoe, Gregory does establish standards and supervise control procedures and final tests.

To Isacksen (personnel), the title reflects Seeburg's long-time respect for its 1300 employees. His charge: to sustain morale and proficiency among the 361 members of the Old Timers group (10 years' service or more) and build morale and craftsmanship among the newcomers joining this growing company each year (157 in 1959).

Each morning in Senior VP Johnson's office, the assistant vice presidents meet to discuss the previous day's performance and to anticipate problems of the new day. The meetings are repeated weekly by Carlman and Kehoe with their foremen. The result of these meetings is a tightly knit organization with objectives well understood and accountability clearly established.

NEW VIGOR IN MANAGEMENT CONTROLS

Plant management can be only as good as the information that guides it along the path of its plans, actions, and controls.

For years Seeburg had an adequate work standards program (measured daywork, no wage incentives) and a standard cost system. Yet the delay in assimilating and reporting shop performance information greatly hampered the effectiveness of these control systems.

Now Seeburg managers depend upon a daily cost reporting system that provides detailed labor and material cost information within 3½ hours after the shift closes. A Remington Rand 409-2R Computer (rental $700 per month) supplies for each depart-

ment and for each unit item the quantity produced and the total labor hours expended. The industrial engineering department hand-posts to the report the labor-hours allowed. Management, right down to the foreman, can then apply corrective measures to exceptions immediately.

George Healey, chief industrial engineer, attributes much of the tightening of cost controls to an improved manufacturing procedures chart that accompanies each order through the plant. It includes all essential operating information feeds and speeds, fixtures, inspection standards, and unit-hour work standards.

What is perhaps the best testimony to the sharpness and accuracy of Seeburg's management controls is the way in which the plant met one of its major labor budget goals in 1959. Set at $3-million, the plant came within $15,000 of the target—less than 1% variation.

NEW DOLLARS IN PLANT EQUIPMENT

The tools of management must include modern tools of production. In simple words this says to plant management: "You've got to spend money to make money."

Spending money on new production equipment and facilities is a big part of Seeburg's program. Some samples: $270,000 for three jig borers needed to work to fine tolerances; $50,000 for 12 new welding machines to achieve semi-automatic production; $6800 for a tangent bender that paid for itself in four months.

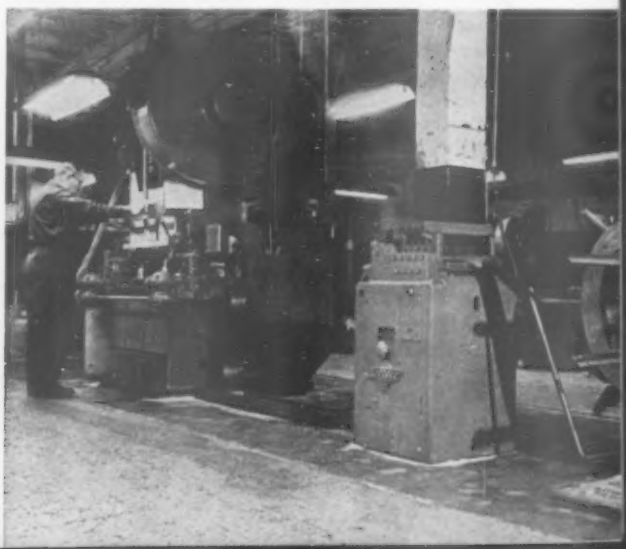
Yet the company is conservative in its approach to building additions. A relatively small maintenance force (22 men) manages to keep Seeburg's group of buildings (newest built in 1952) bright and clean. A good reason is the excellence of the plant housekeeping—a fetish with the operations VPs. Another reason is the constant attention to minor building improvements.

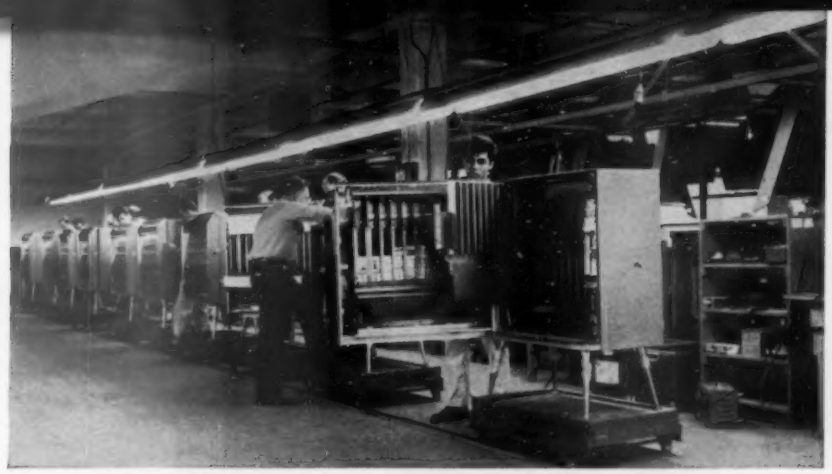
Seeburg's approach to new layouts and new tooling is fresh and unbiased. Allocations are made solely on the basis of demonstrated profitability. "We criss-cross back and forth occasionally in our product flow," says Kehoe, "but you can be sure that the decisions have been made on the basis of actual costs."

START. Emerging from tunnel between buildings, material from subassembly enters cigarette vending machine assembly area. Lines cost $39,000, saved this in three months.

New assembly line (ABOVE),

PIERCING MACHINE automatically rolls, straightens, and feeds parts. It out-performs the old method 5-to-1. And it is saving Seeburg $4.40 per thousand pieces to boot.





TRANSFER. Workmen detach parts from the left-hand conveyor loop and start building up cabinets and large assemblies on the floor-mounted trolley system. Sub-assembly conveyor is overhead. Between-buildings tunnel is in background of picture.

TURN. Foreman checks cabinet with workman before it begins its journey "around the horn" for final assembly.

FINISH. Completed assemblies roll down assembly line for final checkout. Roomy work areas seen here are insisted upon by quality control vice president who feels they encourage fine workmanship. Plant builds 75 to 100 cigarette units a day. It also produces a wide line of coin-operated record players; hot and cold food and beverage vending machines.

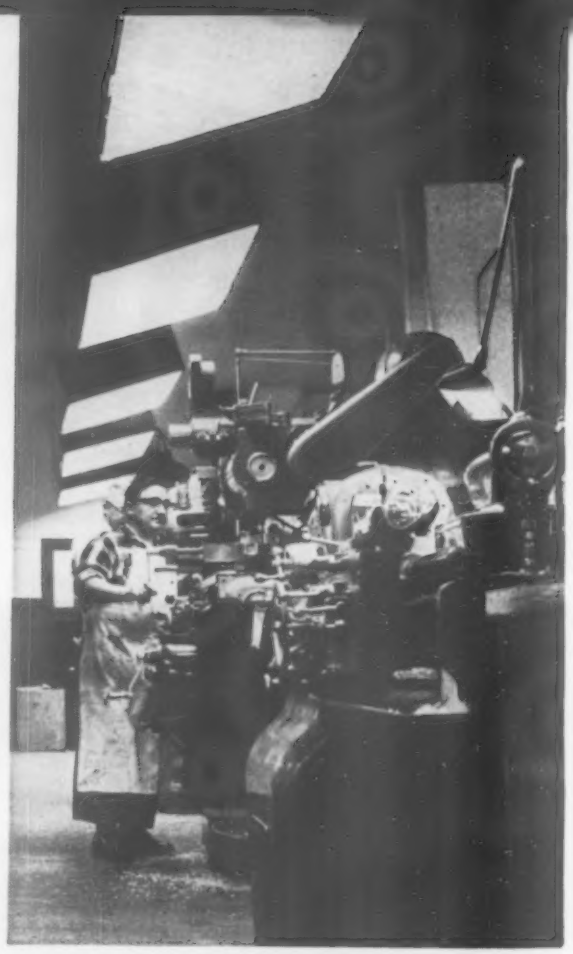
production ideas (BELOW) save Seeburg thousands

AIR TOOLS, each with a special job, enable operator to cut the parts drilling process by a solid 35%.

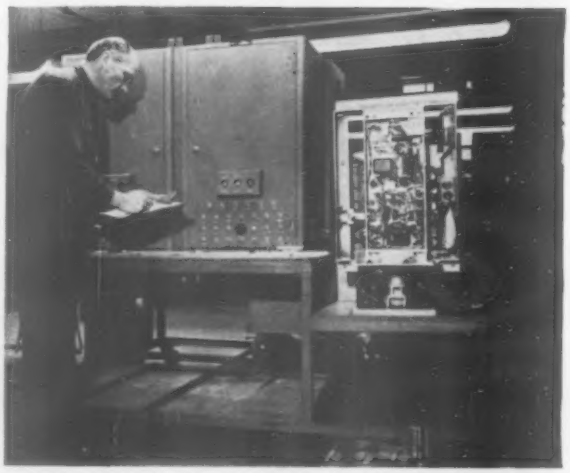
AIR CLAMPS, actuated by a single lever, replaced hand method of holding chassis for milling—cut rejects 90%.

MULTIPLE DRILLING yields 100 castings a day with three men. New way is faster, saves $1.06 per casting.

. . . '60 LIFE FOR A GAY '90s PLANT



Shadow-free lighting (top, right), placed in toolroom, aids precision work. These de luxe home-made lamp fixtures offer high lighting levels without glare. Fixtures contain six 40-watt daylight fluorescent bulbs mounted in welded metal frame. Interior finish is white baked enamel. Outside is covered with chrome-plated trim. A ½-in. plastic honeycomb diffuser is snapped into the lower edge. Cost of fixtures—$57.50. Note roomy work areas, sound absorbing ceiling—all express Seeburg's belief that good working conditions can aid craftsmanship.



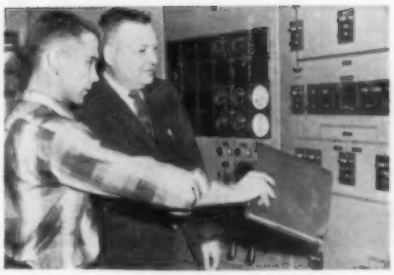
Device makes 12-hour check in two minutes (center, right). This $10,000 inspection wizard, also designed and built by Seeburg, saves 60% on inspection labor, actually makes in 10 minutes a check that used to take 12 hours manually. Manufactured electronic chassis are plugged in to test equipment (at left) by means of quick-connect mechanical wizard (at right). Bridge circuits and stepping switches in test unit check circuits and components after wiring is completed. When defect is detected, instrument stops, indicates area of defect on panel at left. Average speed of test is 100 checks per minute. Seeburg estimates it would take four operators with continuity meters, voltmeters, etc., to outperform this unit.

Torrid Cora does work of 24 men (bottom, right). This $75,000 inspection device automatically tests 6000 tiny ferrite cores an hour. Critical parts, which Seeburg uses at rate of 20,000 a day, are loaded into mechanism at right. Operator manipulates electronic system at left. By applying electrical pulses to cores, machine instantaneously accepts or rejects according to mechanical and electrical standards. Good parts are deposited in container that automatically ejects itself at 1000 pieces. Segregated rejects go into locked container. Manual inspection is prohibitive, could only be done by battery of 24 inspectors. So Seeburg designed and built Torrid Cora to do the job.

MORE!

FEATURE • Plant men at Union Carbide Metals Company rave about their maintenance manual. Says V. A. Johnson, master mechanic: "The book has done a great deal to make our work easier." . . . p. 206

CASE BOOK • Chuck-full of ideas. Most are easily adaptable for both large and small plants. All are geared toward more black ink on your ledger. Read about a machine that cleans up after itself. . . . p. 155

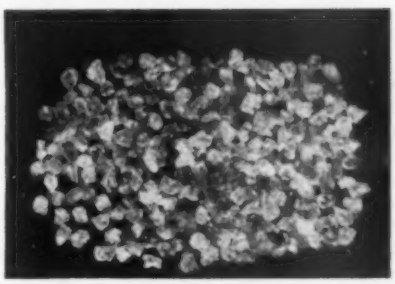


EQUIPMENT • Plastic, color-keyed fastener heads change rusty complexion of sidewalls . . . p. 108

CATALOGS • It's easy to keep your working library up-to-date. Subjects from fans to welders. . . . p. 218

MATERIALS • Man-made diamonds are a grinder's best friend—cut sapphires, germanium, quartz . . . p. 236

FILMS • Interested in training programs, safety, wire splicing, fork trucks, conveying? . . . . . p. 248



IDEAS • Fancy Dan plant firemen wear two oxygen cylinders—one's a 5-min. spare . . . . . p. 176

LABOR RELATIONS • Not all lockouts are unlawful. Three cases tell the difference. . . . . p. 182

HUMAN RELATIONS • Oldsters can give young workers a run for their money in turning out work . . . p. 198

BOOKS • Five new books—on topics from situation games to waste water—get candid analysis . . . p. 244

FACTORY EQUIPMENT NEWS

For more about these items, circle numbers on Reader Service Card next to back cover.

FOR PALLETIZED LOADS . . .

OR ROLLED STOCK.

Fiber strapping challenges steel

A strong new fiber strapping for packages is as safe to handle as cellophane and as light as twine, yet costs less than other materials of equal strength. "Avistrap" is made of high tenacity rayon cord. No sharp edges or jagged ends lash out during tensioning to injure operator. Disposal method? Just burn it. It tightens around corners without cutting into cartons, so won't damage merchandise. And it can't rust.

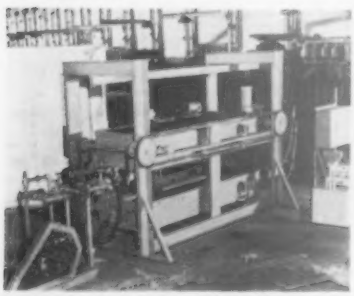
This tape can be attractively imprinted with company name or other message at low cost. There's no storage problem—a 1000-yd. spool measuring 13½ in. in diameter, 6 in. wide, fits into one-fifth the space needed for steel strap. *American Viscose Corp.* (Circle 88).

91—Heat-Resistant Belting for conveyors handles materials at extreme temperatures up to 1100 F. Made of 7 to 12 plies of asbestos and cotton heavily stitched with heat-resistant twine. Double stitching along edge prevents curling. Completely flexible. *Hettrick Mfg. Co.*

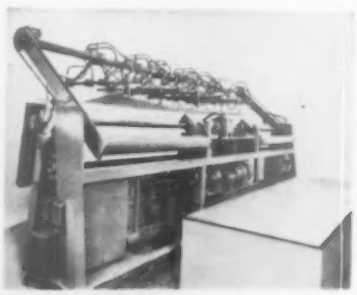
92—Lifetime Ratchet Wrench is permanently lubricated, durably chrome-plated. Design has only seven parts. Absent are springs, screws, pins, balls or small stampings —usual cause of wrench failures. Drive ratchet has 48 teeth, five engaged at all times. *Crescent Tool Co.*

93—Plate Magnets, made of ceramic material, have high field strength over entire plate surface. Can be quickly installed in chutes, spouts, ducts, feed tables, or over screens and conveyors to trap tramp or fine iron. Hinged case has integral handles. *Eriez Mfg. Co.*

94—Color-Coated Fasteners can be color-keyed to any sheet or sidewall to improve appearance of job. Eliminate costly capping or painting of ordinary heads. Plastic head is long lasting, resists weather when applied to No. 305 stainless steel fasteners. *Townsend Co.*

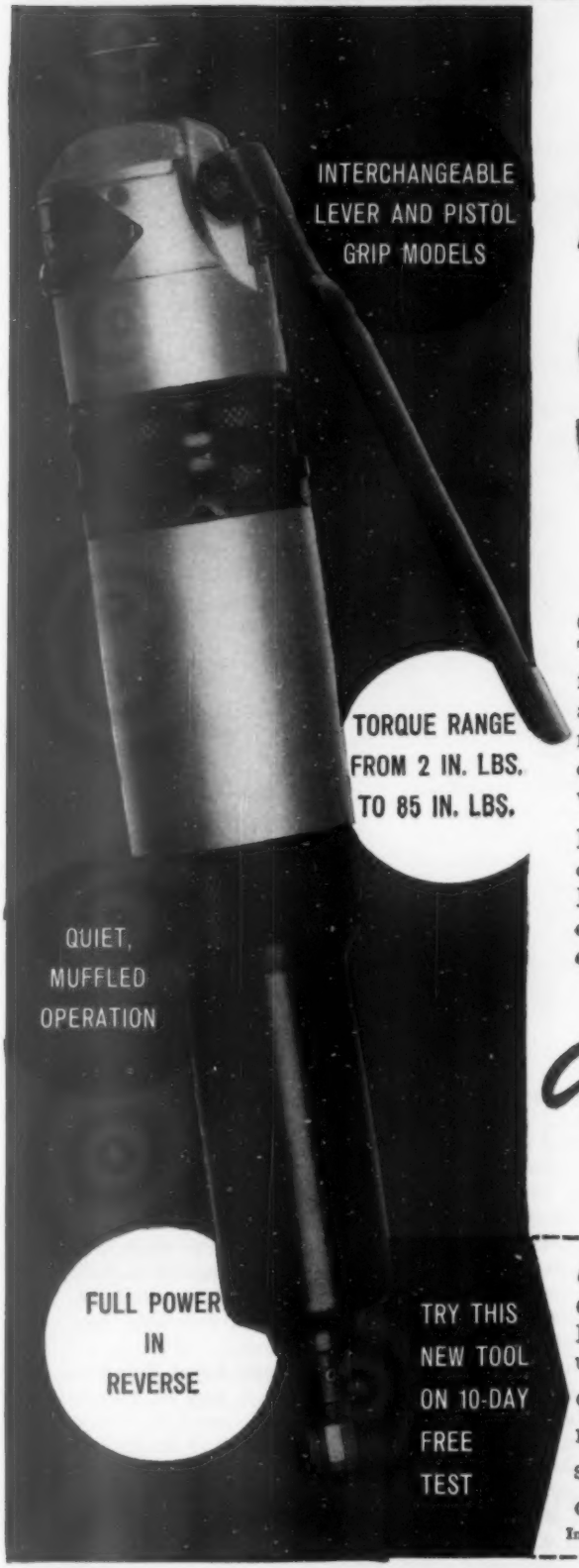

89—Dip Tank, for applying varnish insulation, automatically rises to immerse work carried to it by overhead conveyor. Then it recedes to permit part to move on. System uses two 8-ft. tanks, one for varnish, lower one for storage. Occupies only 6x14 ft. *The R. C. Mahon Co.*

90—Tape Dispenser, lightweight and portable for fast packing operations, lowers shipping costs. Simple tension adjustment assures good banding job each time. Trigger-action cutter snips off exact length of tape needed—no waste. *Mystik Adhesive Products, Inc.*


95—Sheet Feeder grips up to 20-ft. sheets of any material or shape (including corrugated) from one side, deposits it on other side. Handles up to 10 sheets per min. Transfers from processing or conveying equipment to pile (to 30 in. high) or vice versa. *The de Florez Co.*

Turn the page

For new, set-it-and-forget-it fastener control...


INTERCHANGEABLE LEVER AND PISTOL GRIP MODELS
TORQUE RANGE FROM 2 IN. LBS. TO 85 IN. LBS.
QUIET, MUFFLED OPERATION
FULL POWER IN REVERSE
TRY THIS NEW TOOL ON 10-DAY FREE TEST

ACCURATE SMOOTH

NEW MASTER POWER TORQUE LIMITER

One screw or 1,000, Master Power's new Torque Limiter gives you the never-failing, fool-proof torque control that prevents damage to screws, nuts or work—stops costly reworking—lengthens bit life many times over—eliminates need for hand torque wrenches.

Before you settle on any assembly tool, try our free 10-day trial! Use the new Torque Limiter on your jobs. See how Master Power *customizes* its tools to your needs. Mail the coupon today.

Master Power

CORPORATION • BEDFORD, OHIO

A Black & Decker Subsidiary

See "Tools-Electric" -Yellow Pages- for Service & Sales

Master Power **DEPT. 307, BEDFORD, OHIO.**

Gentlemen: I want to run a Master Power 10-Day Tool Test on your new Torque Limiter. I understand there is no obligation.

Company.....

Individual.....

Street.....

City.....Zone.....State.....

In Canada: Master Pneumatic Tools (Canada) Ltd., Rexdale, Toronto, Ont.

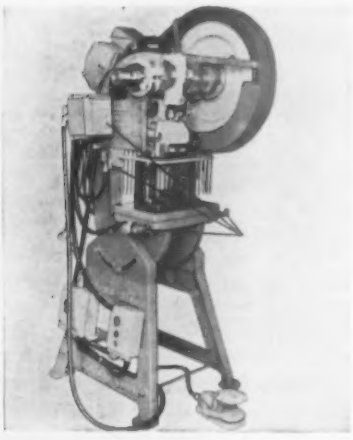
For more about these items, circle numbers on Reader Service Card next to back cover.

Peek-a-boo door switchgear

Being a Peeping Tom may prevent unnecessary hazard when servicing this new line of 4160-volt circuit breakers and switchgear. Peephole, in this case, is extra door at floor level of cubicle. When it's open, operator can see if breaker is in test or disconnect position. Through this door, he can move breaker to any position without opening main cubicle door, thus preventing accidental injury. Breakers, which can be stored in compartment in disconnect or test positions, use spring-stored energy closing for maximum speed and safety.

One man can service this compact, space-saving equipment by himself. New lightweight no-iron chutes have flat-wound blowout coils. This design promotes uniform five-cycle interruption without time lag—is easy to service. Control needs about one-tenth the power used by other types of actuating systems. ***I-T-E Circuit Breaker Co.*** (Circle 96).

Safety switch for all power press set-ups



All power machinery in the punch press, shear, or molding press class can be fitted with this automatic control to protect the operator from injury. Easily attached to equipment, it adapts to any one of these five operating set-ups: foot switch, one-hand non-automatic; one-hand automatic; two-hand non-automatic; two-hand automatic.

The guard, when in place, allows the control to function with all methods. But once guard is removed, control can only be used with two-hand non-automatic method. A turn of knob selects set-up. *Protectomatic, Inc.* (Circle 97).

98—Aluminum Reflectors, in 16- and 18-in.-dia. sizes, come in socket type, or specially constructed for pendant or box-type mounting. Come with white and gray hoods to identify mercury vapor and incandescent lamps when units are in tandem. *Quadrangle Mfg. Co.*

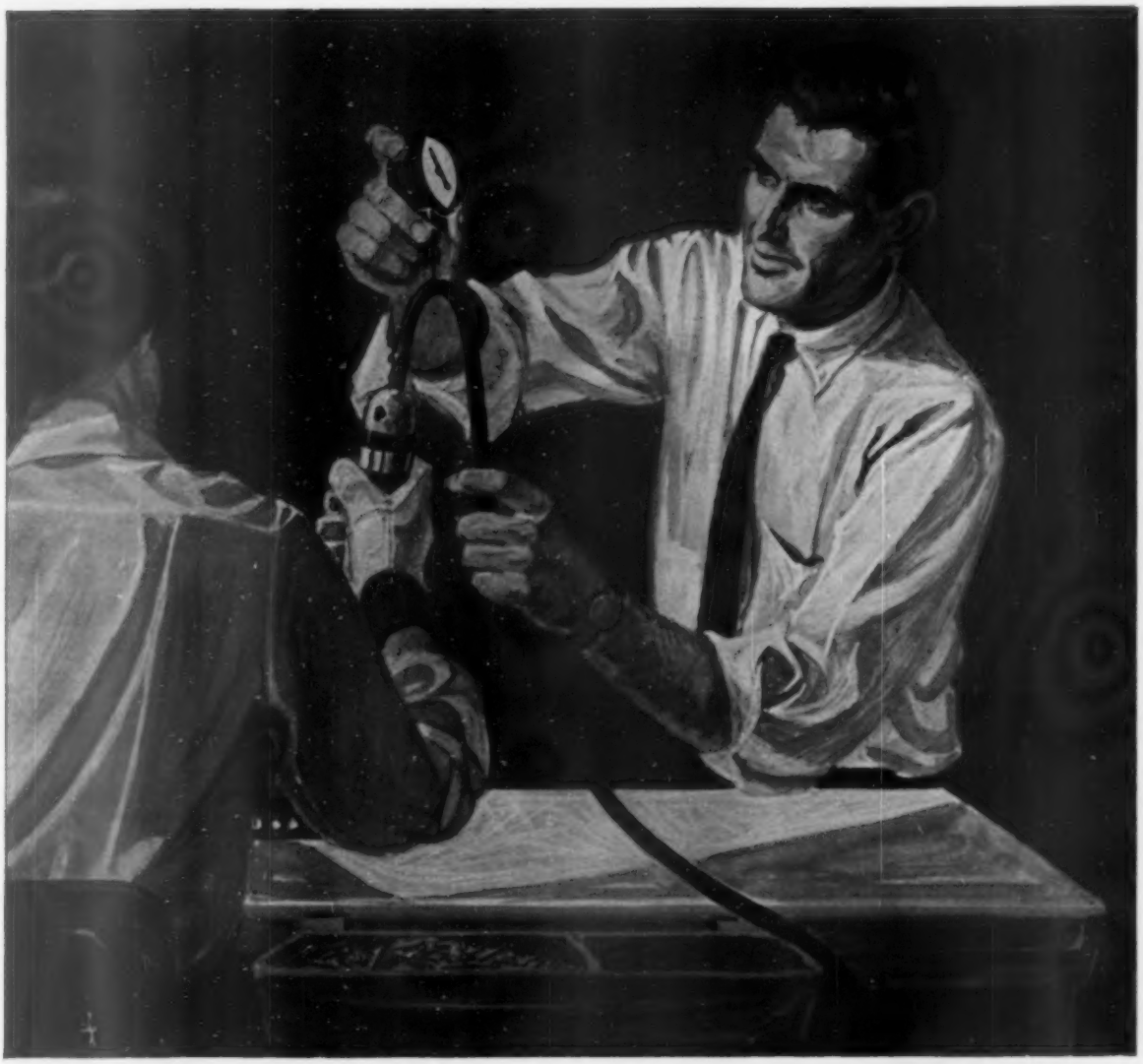
99—Aluminum Chain Hoist has noiseless load brake for fast, easy, and safe lowering. Danger of accidents, caused by worn-out ratchet wheel or lock pawls, is eliminated. Lightweight (26½ lb.); 1000-lb. capacity. One man can lift and hang. *Reading Crane & Hoist Corp.*

100—Electric Airduct Heaters, covered with ceramic-coated metal sheath, withstand corrosion despite exposure to high humidity. Two types, for existing ductwork or for new installations. Capacities: 2 to 100 kw., 120 to 550 v.; sizes to 28x48 in. *Edwin L. Wiegand Co.*

101—Clamp Attachment, for lift trucks, handles both palletized and non-palletized loads. Hydraulically actuated arms grip (on sides) loads ranging from 18 to 46 in. or 23 to 60 in. Arms convert to forks for pallet loads, skids, platforms, etc. *Lewis-Shepard Products, Inc.*

102—Hopper Level Indicator, explosion-proof, may be mounted directly to bin surface without special adapters. Small (7 in. dia.), it uses little space—ideal for small hoppers. Has one control switch to operate relays, feeding devices; second switch optional. *Syntron, Inc.*

Turn the page



He detects low-pressure air power

A pressure drop between air compressor and air tools *steals power dollars* like a thief in the night. Each tool slows down a little; each piece of pneumatic equipment loses some of its power. Although the slowdown may grow undetected, *plant efficiency suffers.*

A Gardner-Denver Compressed Air Specialist is an expert at diagnosing off-pressure air power. Dedicated to keeping compressed air systems at peak efficiency, he often prescribes simple remedies which restore normal air pressure without adding a new compressor. He will suggest a test for air leaks, and a search for fouled, undersized or extended air lines. He may recommend a schedule of preventive maintenance.

If he should find that the need is for a larger compressed air supply, he may recommend additional compressor capacity from Gardner-Denver's complete line. For a compressed air check-up in your plant, call your nearest Gardner-Denver branch.

EQUIPMENT TODAY FOR THE CHALLENGE OF TOMORROW

GARDNER-DENVER

Gardner-Denver Company, Quincy, Illinois
In Canada: Gardner-Denver Company (Canada), Ltd., 14 Curity Avenue, Toronto 16, Ontario

For more facts Circle 430 on Reader Service Card

They're made of National Vulcanized Fibre, a cellulosic plastic. Come in a "jillion" styles and sizes for any materials handling need.

Get the full, cost-cutting Kennett story now. Write for Bulletin O-6 today.

KENNETT
RECEPTACLES BY
NATIONAL
VULCANIZED FIBRE CO.
WILMINGTON 99, DELAWARE

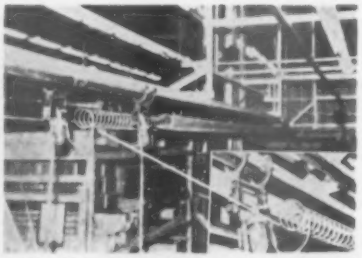
For more about these items, circle numbers on Reader Service Card next to back cover.

103—Maintenance Cart is equipped with tubes to hold brooms and mops, hangers for whisk brooms and dust pan, and removable heavy cotton bag. Recessed tray holds bottles, etc. Platform carries drum, buckets, vacuum cleaner. Easy to maneuver. *Atlas Products Co.*

104—Btu. Meter, sweep balance type, has exceptional temperature sensitivity. Accurately measures heat removed or added to fluids in heating or cooling system on basis of recorded consumption. Simple design; requires no amplifiers. *Air Conditioning Equipment Corp.*

105—Stack-On Pallet permits irregular-shaped products to be tiered, transported in groups or stored easily and flexibly. In 42x48-in. and 42x60-in. sizes, 4000-lb. capacities. Legs slip into pockets for assembly. Needs no nuts, bolts, other fixtures. *Johnson-Flaherty.*

106—Ultrasonic Controller, a non-contact sensing and switching system, counts, sorts, routes. It safeguards machines, protects plants, controls doors, hopper and bin levels, etc. Senses liquids, solids, nonferrous metals, opaque or transparent objects. *Delavan Mfg. Co.*



107—Flexible Air Hose extends and retracts like phone extension cord. Stores compactly in space-saving 5-in.-dia. coil. Hose, 25 ft. long, has extended working length of 20 ft. Eliminates hose reels, other bulky storage equipment. In ⅜ in. ID. *Samuel Moore & Co.*

108—Recording pH Meter has 63-ft. roll of pressure-sensitive chart paper that lasts for 31 days at 1 in. per hr. Uses standard radio tubes. Front panel switch disconnects chart drive—instrument becomes indicating pH meter. Price, $195. *Analytical Measurements, Inc.*

Turn to page 116

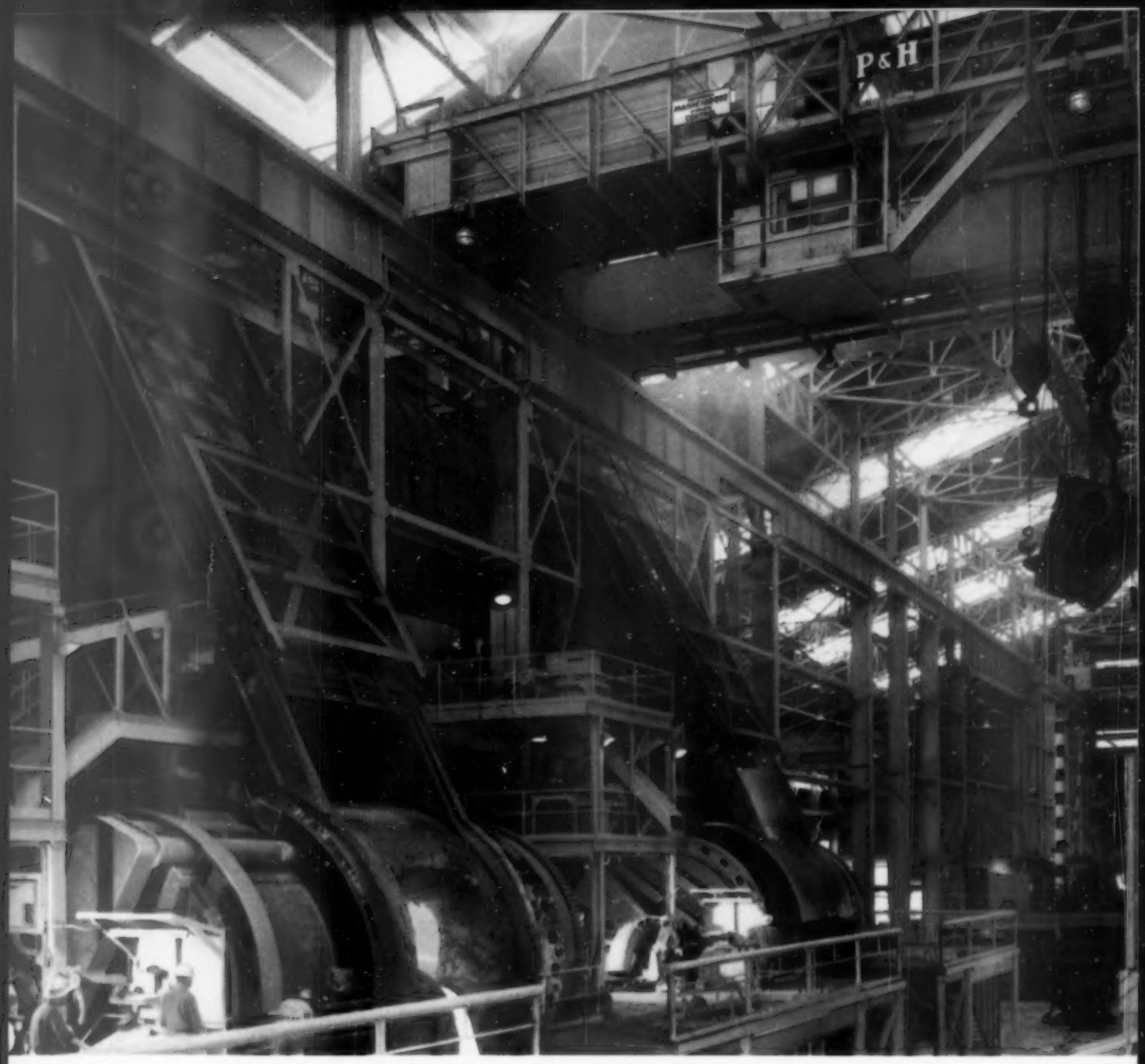


Photo Courtesy Ray Mines Division, Kennecott Copper Corporation

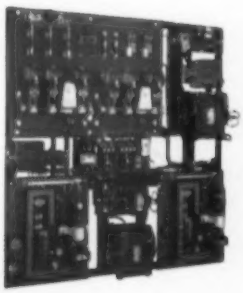
FOR EVERY APPLICATION, THERE'S ONE CRANE OUTSTANDING...

IN COPPER SMELTERS: Fast, safe, precision control is essential in a converter aisle like this. This 60-ton P&H crane is equipped with the finest a-c crane control yet designed — P&H Electronic Stepless Control and Magnetorque electro-magnetic braking.

Here, as in every P&H crane installation, P&H engineers have taken all factors affecting performance into consideration. Exact requirements of this converter-aisle installation have been carefully integrated into the overall design.

If this kind of custom engineering makes sense to you for your operation, why not send for more information? Write for bulletin C-42, Dept. 118, Harnischfeger Corporation, Milwaukee 46, Wis.

Heart of the P&H Electronic Stepless Control is this a-c electronic hoisting-lowering control panel. With this modern electronic control on a three-motor crane, as many as 244 electrical contacts are eliminated. Speed-load characteristics of Electronic Stepless Control far exceed any other conventional a-c or d-c controlled crane!



P&H
OVERHEAD CRANES

HARNISCHFEGER
Milwaukee 46, Wisconsin

HERE'S A HOIST WITH A "SENSE OF TOUCH"

This P&H two-speed hoist is perfect for spotting the massive, but delicate, head of a 2-million volt industrial x-ray machine. There's a high speed for quick movement . . . and a slow speed for sensitive, hairline placement. The control is responsive and sure, permitting the operator to literally "feel" his load into position.

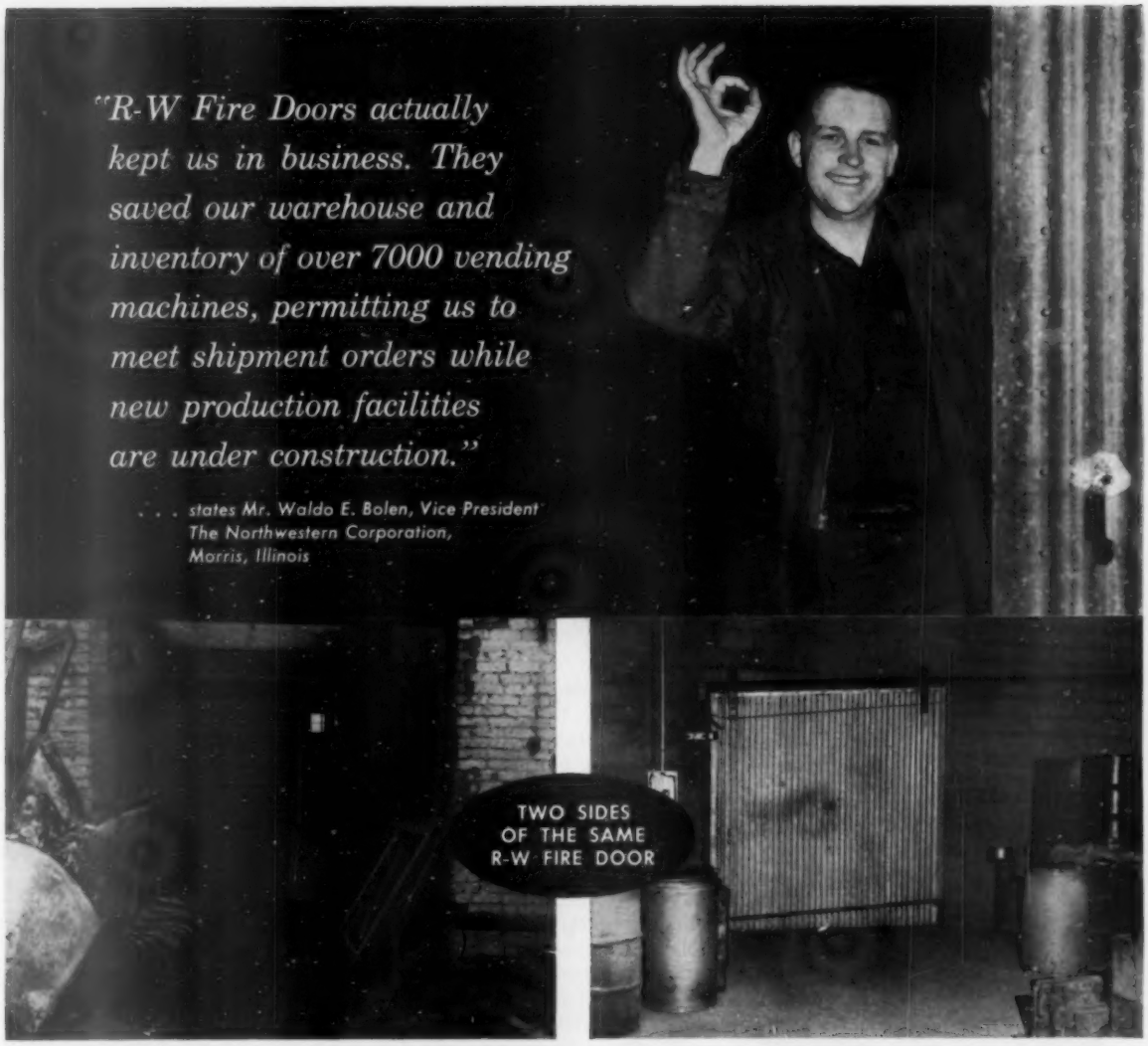
P&H Balanced Design Hevi-Lift hoists are engineered to provide just this kind of "no-compromise" performance. Every part of these hoists — including the 24-volt push-button control — has been matched or balanced with every other part for maximum strength, temperature, and performance characteristics. As a result, Balanced Design Hevi-Lifts provide greater accuracy of control under all load conditions, stand up longer under heavier duty cycles — with less maintenance — than any other hoists made today!

Find out more about P&H Balanced Design hoists. Available in standard single- or two-speed models, to fit your particular need. Call your local P&H hoist distributor, or write for bulletin H-55, to Dept. 224, Harnischfeger Corporation, Milwaukee 46, Wisconsin.

P&H
HEVI-LIFT HOISTS

HARNISCHFEGER
Milwaukee 46, Wisconsin

Photo courtesy General Electric Company, X-Ray Department


"R-W Fire Doors actually kept us in business. They saved our warehouse and inventory of over 7000 vending machines, permitting us to meet shipment orders while new production facilities are under construction."
. . . states Mr. Waldo E. Bolen, Vice President The Northwestern Corporation, Morris, Illinois
TWO SIDES OF THE SAME R-W FIRE DOOR

R-W "FyeR-Wall" FIRE DOORS AGAIN PROVE THEIR VALUE!

Fire broke out in the production department of the Northwestern Corporation, manufacturers of vending machines, early one morning. In just a few hours the complete production facilities and adjoining offices were destroyed . . . a loss estimated at over $500,000.00. The adjoining warehouse that was separated from the production department by R-W "FyeR-Wall" No. 347 Corrugated Steel Fire Doors, was not damaged. The photos above provide graphic testimony to the value of R-W Fire Doors. While the fire wrought havoc on the production department side of the doors, the roaring inferno was stopped from entering the warehouse. The extreme fire damage is evident in the photo above left, while the warehouse area, photo above right, is clean and free from fire or smoke damage.

R-W Fire Doors are Underwriters and Factory Mutual Laboratories approved for class A, B, C, D, E and F openings. "FyeR-Wall" Corrugated Doors are but one of many types of fine Doors offered by R-W . . . each type is designed to offer specific characteristics to meet various requirements. Complete hardware for single or double link operation.

Write today for complete information on how R-W Fire Doors will provide added safety for your plant . . . request your free copy of Catalog No. A-420.

Richards-Wilcox

MANUFACTURING COMPANY

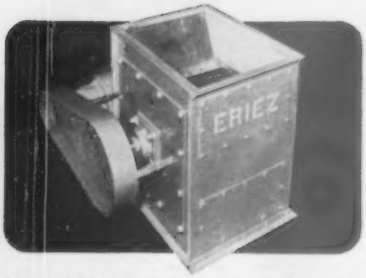
A HANGER FOR ANY DOOR THAT SLIDES

410 W. THIRD ST. • AURORA, ILL. • Branches in Principal Cities

UP TO 50% STRONGER than old-style drums!

ERIEZ

*Erium powered PERMANENT MAGNETIC DRUMS



New, expanded line provides more magnetic power, increased protection! For automatic continuous removal of medium fine iron and tramp iron from foods, grains, plastics, rubber, ceramics, etc. Protects machinery, prevents fires and explosions, eliminates product contamination. Quickly, easily installed at discharge end of chutes, spouts, screw conveyors, etc. *Now with replaceable shell and bearings to eliminate costly maintenance problems!*

*Erium — *an exclusive, high quality permanent magnetic power source specifically designed and energized by Eriez.* — Non-electric; no wires, attachments or fuses — No operating or maintenance costs — For wet or dry materials — Self-cleaning — With or without housings — Adjustable magnetic element; easy drum removal — Wide range of models and sizes.

WRITE TODAY FOR DESCRIPTIVE LITERATURE INCLUDING INSTALLATION AND APPLICATION INFORMATION

Eriez Mfg. Co., 70-GA Magnet Dr., Erie, Pa.

ERIEZ

Circle 434 on Reader Service Card

FACTORY/EQUIPMENT NEWS

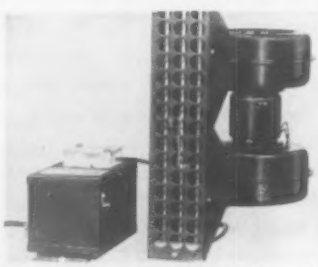
Begins on page 108

For more about these items, circle item numbers on Reader Service Card next to back cover.

109—Vacuum Turnover Unit grips and lifts stainless steel sheets up to 180 lb. Lightweight, it has power pack mounted (for close tolerance) on pad beam 9 ft. long with three 2-ft. 6-in. adjustable cross arms to handle sheets to 14 ft. Tilts to 90 deg. *Vac-U-Lift Co.*

110—Spray Marking Machine automatically fills in depressed numerals, letters, and calibration markings, then wipes and polishes. Handles up to 2000 pieces per hr. Parts, loaded into machine, go to spray station for filling, then to drying, polishing. *Conforming Matrix Corp.*

111—Auto-Stop Meter of stainless steel automatically controls predetermined quantities of corrosive liquids for batching and processing. One moving element is exposed to liquid. Capacity from 20 to 100 gpm. No slip or drift once calibrated. *Neptune Meter Co.*



112—Static Eliminator is said to neutralize static at distances to 4 ft. on materials passing through air stream. In two sizes, with an effective length of 10 in. or 20 in. (photo). Can be used in tandem for large parts or wide materials. Power-pack operated. *Simco Co.*

Turn the page

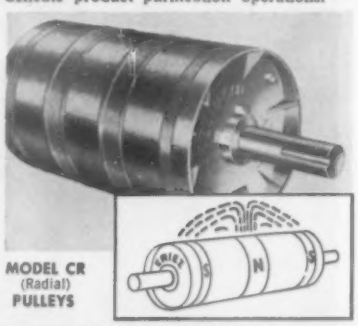
Most Complete Line Ever!

ERIEZ

permanent non-electric Erium-powered MAGNETIC PULLEYS

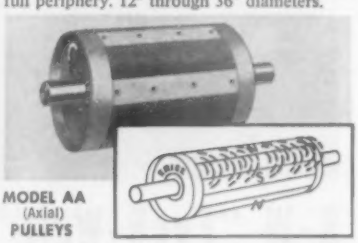
Now in 2 "duty-rated" designs—to give you the finest automatic separation for your exact application—fine iron or tramp iron removal.

NEW, EXPANDED LINE! New design, new magnetic efficiency permit increased operating range and effectiveness with 2 different magnetic actions. Peak protection for all operations —from rugged crusher protection through delicate product purification operations.



MODEL CR (Radial) PULLEYS

For removing large pieces of tramp iron from heavy depths of flow. Provides a strong, deep magnetic field of equal intensity around the full periphery. 12" through 36" diameters.



MODEL AA (Axial) PULLEYS

Excellent for nne iron separation, as well as small and medium pieces of tramp iron, in average material flows! Strong magnetic field of equal force extends across the full width of the pulley. 8", 12", 15", & 18" diameters.

Prevent product contamination, machinery damage, fires, explosions, downtime. 2 designs, 4 magnetic strengths, 8 diameters, 14 belt widths. No operating or maintenance costs. For all materials, wet or dry, on belts of non magnetic material. Fast, simple installation.

**Erium —an exclusive, high quality permanent magnetic power source specifically designed and energized by Eriez.*

New fact-filled 6-page bulletin has installation photos, selector guide, etc. Write today! Eriez Mfg. Co., 70-GB Magnet Drive, Erie, Pa.

ERIEZ

Circle 435 on Reader Service Card

LINK-BELT Power-and-Free conveyor system

conveys, sorts, stores

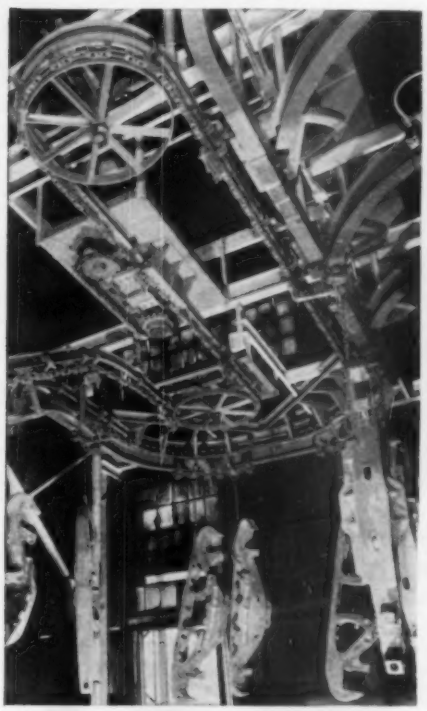
Versatile conveyors permit straight-line production even where processing speeds vary

THE most complex, multi-phase handling can be performed with smooth precision by Link-Belt Power-and-Free conveyors. Coupled with suitable control systems, they automatically carry out any combination of routing, storage and recirculation.

These versatile conveyors transport parts to work areas, leave them there to be processed, or circulate them in the system until they're ready to be used. They reclaim material from storage as needed. And cargo can be slowed down, speeded up or stopped . . . moved vertically, pivoted, indexed, dumped or dipped.

Link-Belt Power-and-Free conveyors fit easily and economically into both modernization and new building plans. They can be tailored to practically any layout or production requirement. For complete information, contact your nearest Link-Belt office.

CASTING CARAVAN — Weighing almost 1000 lbs. each, railroad car castings are carried smoothly from annealing furnace to shot-blast cleaning machine at Scullin Steel's foundry, St. Louis, Missouri. Power conveyor engages load bar trolleys on free track by means of special attachments on the power chain.

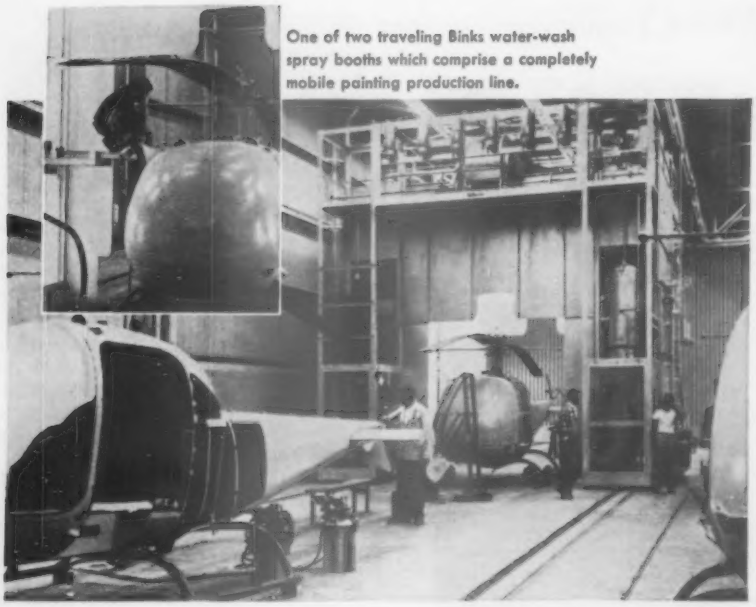


RIDING HIGH — After leaving the annealing furnace, castings are taken up near the ceiling to storage lines. This Link-Belt Power-and-Free system has four free storage lines and, through selective switching, castings can be directed to any one of them.

LINK-BELT

TROLLEY CONVEYORS

LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants, Warehouses and District Sales Offices in All Principal Cities. Export Office, New York 7; Australia, Marrickville (Sydney); Brazil, Sao Paulo; Canada; Scarboro (Toronto 13); South Africa, Springs. Representatives Throughout the World. 15,356



One of two traveling Binks water-wash spray booths which comprise a completely mobile painting production line.

At Bell Helicopter, Fort Worth, Texas...

traveling spray booths help cut painting time 80%

"Helicopters are difficult to move down an assembly line so we decided to move the assembly line past the helicopters," states the paint shop foreman at Bell Helicopter, Fort Worth, Texas.

Two traveling spray booths
With the help of Bell personnel, Binks spray finishing engineers developed two giant traveling spray booths mounted on rails. Each carries with it all the equipment needed for spray painting, from spray guns to air compressors. After a helicopter is painted, the booth moves down the line.

Clean air vented at ceiling
No fixed exhaust stack could be used with a traveling booth, so Binks engineers recommended the use of water-wash spray booths. The water-wash system completely traps overspray paint pigments and fumes so that air exhausted through louvered ducts in the room ceiling is clean. There is no pipe connection between the exhaust stack and the ducts.

Complete equipment line and design help available
Whether your need is for a special custom installation of the type reported here or an integrated system using standard components, it will pay you to check first with Binks.

Details in Bulletin 975
Ask your Binks Branch Office for a copy, or write direct.

Ask about our spray painting school
Open to all...NO TUITION...covers all phases.

0343

Binks
EVERYTHING FOR SPRAY PAINTING

SPRAY GUNS

AIR COMPRESSORS

NATIONWIDE SERVICE

Binks Manufacturing Company
3114-34 West Carroll Ave., Chicago 12, Ill.

REPRESENTATIVES IN PRINCIPAL U.S. & CANADIAN CITIES • SEE YOUR CLASSIFIED DIRECTORY

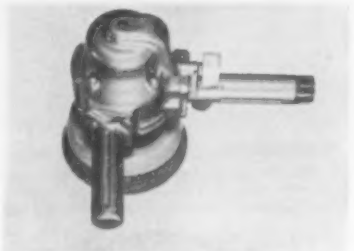
FACTORY/EQUIPMENT NEWS

Begins on page 108

For more about these items, circle item numbers on Reader Service Card next to back cover.

113—Mobile Floor Crane has telescoping mast that adjusts to three positions for reaching (to 62 in.), lifting (to 1500 lb. retracted), and moving jobs. Multi-purpose unit handles heavy parts, dies, machinery; stacks drums, boxes. Boom 105 in. high. *Therm Machine Co.*

114—Voltage Regulator for large machines is static-magnetic, handles 3-phase circuits from 50 to 2000 kva. Has no moving parts, no tubes; needs no manual adjustments or routine maintenance. Response time, 1.5 cycles. Input range, 600 v. to 15 kv. *Sola Electric Co.*



115—Air Grinder-Sander uses direct drive to operate 6-in. cup wheel for medium-heavy duty work. Three throttle arrangements. Handle can be positioned from 90 to 120 deg. from throttle or removed for close work. In 4500 to 8000 rpm. Weighs 7½ lb. *Cleco Air Tools.*

Turn the page

PERFORMANCE STARTS HERE

A 1/1000th inch mistake can reduce a rotary pump's capacity by 10%

Close tolerances are extremely important in a rotary pump. Capacity, efficiency, quietness, and low maintenance depends on the accuracy built into the pump.

That's why Worthington has invested many hundreds of thousands of dollars in precision equipment designed specifically for the manufacture of rotary pumps. The air-gauging machine above, for example, checks the interior dimensions of a rotary to an accuracy of one ten-thousandth of an inch.

Every Worthington rotary is meticulously checked at each stage of construction. When you buy a Worthington pump, rotary or centrifugal, this quality is yours at no extra cost.

For the name of your nearest Worthington pump distributor consult the Yellow Pages. Or write to Worthington Corporation, Section 20-16, Harrison, New Jersey.

WORTHINGTON

For more facts Circle 438 on Reader Service Card

ACTUAL X-RAY PHOTO* OF TRI-CLAD® '55' 7½ HP MOTOR

GENERAL ELECTRIC

Exclusive General Electric Thermo-Tector† System Eliminates Overload Burnouts

ALLOWS MAXIMUM MOTOR OUTPUT— SAFELY!

Now—Tri-Clad '55' motors have simple, direct-acting thermal protectors that positively prevent overload failures!

New Thermo-Tector heat-sensing switches buried in motor windings react *instantly* to prevent heat damage. Unique Thermo-Tector "anticipation" feature varies motor shutoff point according to rate of winding heat rise. This ends need for operating safety margin, allows you to get *full output* from Tri-Clad '55' motors.

Thermo-Tector system requires *no costly amplifying relays*—works with any conventional G-E motor controller. Thermo-Tector protection is available on *all* Tri-Clad '55' motors in frames 254U-445U.

For more information, contact your General Electric Apparatus Sales Office or write for Bulletin GEA-7092, Section 866-01, Schenectady 5, New York.

*Photo made from radiograph taken with 1,000,000-volt G-E Resotron® X-ray machine at General Electric's Large Steam Turbine-Generator Department.

†Trade-mark of General Electric Company.

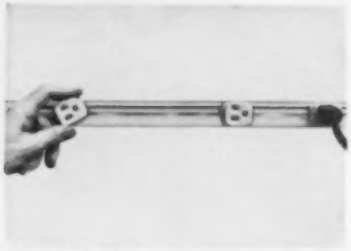
SMALL AC MOTOR & GENERATOR DEPT.

GENERAL ELECTRIC

SCHENECTADY 5, NEW YORK

For more about these items, circle numbers on Reader Service Card next to back cover.

116—Radiant Heaters, for overhead suspension, provide quick infra-red spot heat. Saucer-shaped ceramic-coated radiating surface projects heat evenly. Uses no fans, motors, or limit switches. Built-in safety controls. Input: 24,000 to 48,000 Btu. per hr. *Solarflo Co.*

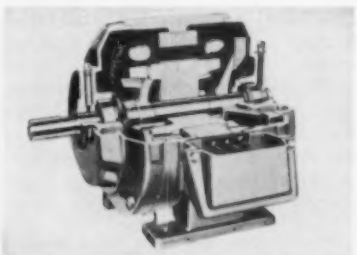


120—Three-Wire Electrostrip provides electrical outlets anywhere along its length. Eliminates need for long extension cords, costly rewiring. Accepts two or three-pronged plugs. Comes in rolls. Safety grounded. Rated 20 amp., 125 v. a-c. *I-T-E Circuit Breaker Co.*

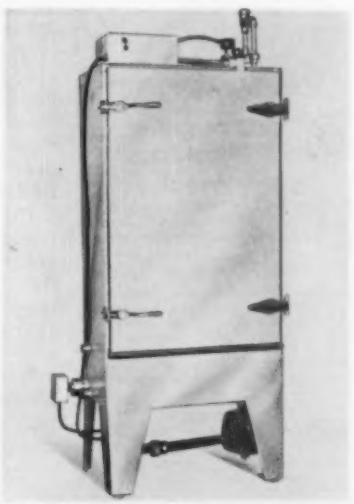
117—Light Dimmer is a 1½-lb. mighty midget that controls up to 12,000 watts, drawing only enough power for desired light level. Uses static or solid-state components. Maintains constant light level automatically as daylight fades. *International Research Associates.*

121—Mobile Core Drill, powered by induction-type motor with direct drive to spindle, guarantees fast, superior drilling. For masonry, stone, refractories, concrete (steel-reinforced). Three models for holes to 2, 6½ or 14 in. Motor overload protection. *Clipper Mfg. Co.*

118—Portable Check Bench tests pressure and vacuum switches on the spot. Comes with one high and one low 7/16-20 pressure port; pressure gages give one-half of 1% accuracy. Operates on 28 v. d-c at 400 psi. Built-in safety prevents pressure damage. *Custom Components.*

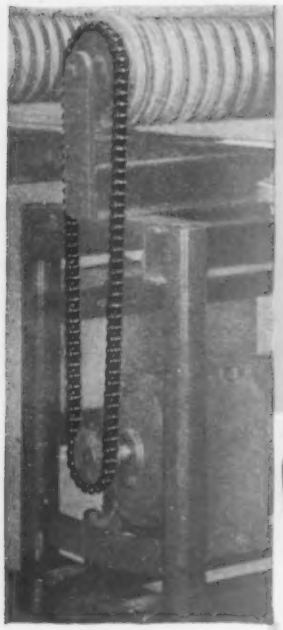


119—Open A-C Motor has insulation system encased in epoxy resin to resist moisture, oils, dust, chemicals, acids, alkalies. In solid cast-iron frame, it exceeds splashproof motor specs. In 180 to 445 U frames; all speeds, voltages. *Reliance Electric & Engineering Co.*



122—Trash Can Washer takes three minutes to automatically wash, rinse, sanitize refuse and waste cans to 22 in. dia., 30 in. high. Uses hot water with detergent at 140 F. under 40-lb. pressure. No vibration, thus no need to bolt unit to floor. *Washburn & Granger, Inc.*

Turn the page



WHITNEY MSL* SELF-LUBRICATING CHAIN Keeps Loads Rolling

For POWER-CURVE'S CONVEYORS

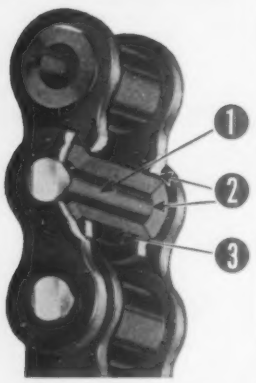
Power Curve's Bag and Package Loader works like a mechanical stevedore in high speed loading of box cars and trucks. The chain drives which shuttle and power this flexible conveyor must have plenty of stamina to withstand continuous shock loads from delivering chutes, and to propel loads in and out of cars.

To provide greater drive chain durability, Power-Curve engineers rely exclusively on Whitney MSL Self-Lubricating Chain.

The basic problem in chain operation has always been that more damage is caused by faulty chain lubrication at the 3 critical areas, than by years of normal service. Whitney Research has solved this problem through the development of a lubricated-for-life chain that outlasts ordinary chain as much as 5 to 1.

Oil-impregnated, Sintered Steel Bushings release a constant supply of lubricant under pressure and heat . . . re-absorb the oil when the drive stops . . . insure a permanent oil supply for the life of the chain.

For exceptional drive chain performance, long life, and for sure resistance to dust, dirt and other abrasives, specify and use Whitney MSL Chain. All essential dimensions conform fully to ASA Standards for complete interchangeability with any similar pitch chain.



Built-in Lubrication at these 3 Critical Areas

Critical Area 1:

PIN—Protective oil film lubricates live bearing area between pin and bushing, minimizing wear by reducing metal-to-metal contact.

Critical Area 2:

PLATES—Oil-impregnated Sintered Steel Bushings extend beyond surface of inside plates to: act as lubricated thrust bearings, control clearance, and provide an oil cushion between plates, eliminating plate galling and seizing frequently caused by misalignment of sprockets.

Critical Area 3:

SPROCKET ENGAGEMENT—Oil film on MSL Bushing exterior provides constant lubrication between sprocket teeth and chain. Whitney MSL Chain requires no rollers, as the tough oil film on the bushing surface provides smooth sprocket engagement, cushions impact and reduces drive wear.

Your Whitney Chain Distributor has a complete stock on hand, ready for immediate delivery. Consult him today.

*Maximum Service Life

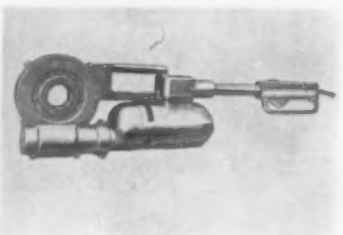
THE WHITNEY CHAIN COMPANY
a subsidiary of FOOTE BROS. GEAR AND MACHINE CORPORATION
4585 S. Western Blvd., Chicago 9, Ill.

POWER TRANSMISSION DRIVES

FACTORY/EQUIPMENT NEWS

Begins on page 108

For more about these items, circle item numbers on Reader Service Card next to back cover.



123—Power Pipe Threader weighs 20 lb., threads ¼-in. to 4-in. pipe. Powered by a ¾-hp. motor, unit can adapt to thread bolts, dig holes, open and shut valves, and pull wires through conduit. Pipe up to 1-in. threads in 20 sec.; up to 2 in. in 1 min. *Albertson & Co., Inc.*

124—Immersible Transducers can be used to add ultrasonic cleaning stages to existing tanks or vapor degreasers. Designed for use with most cleaning solutions, solvents and detergents, mild acids and caustics at temperatures up to 180 F. *National Ultrasonic Corp.*

125—Airless Spray Pumps supply coating materials to spray guns at a hydraulic pressure estimated at 20 times the air supply pressure. This virtually eliminates fog and overspray, offers up to 50% savings in paint, says the builder. Several models. *Aro Equipment Corp.*

Turn the page

Thor

Everything you want in Torque Control···

and more!

Thor Uni-Tork screwdrivers and nut setters make torque control of threaded fasteners as simple as turning on a light. Operator judgment and guesswork is gone. Uni-Tork snaps out of engagement when desired torque is reached, snaps in again when applied to the work. Thor Uni-Tork air tools have external torque adjustments from 10 to 100 inch-pounds. Available on all Thor air screwdrivers and nut setters and on Thor electric tools. Your Thor factory representative or distributor will show you the tools that think for themselves. Thor Power Tool Company, Aurora, Illinois. Branches in all principal cities.

For more facts Circle 441 on Reader Service Card

at CHRYSLER...

REMOVING CHIPS FROM WATER PUMP PASSAGE HOLES AFTER MACHINING. CHRYSLER ENGINE PLANT, DETROIT, MICH.

SPENCER
VACUUM CLEANERS

• GUARD QUALITY
• CUT ASSEMBLY COSTS

Operations performed here by Spencer vacuum cleaners include:

• Removing chips during assembly of head to block • Cleaning oil filter pad inlet passages • Automatically cleaning bearing cap assembly on block • Automatically removing core sand from engine block castings • Cleaning floors and conveyors.

In large plant or small . . . for maintenance or production needs . . . portable units or installed systems . . . whatever your requirements, it will pay to check with SPENCER.

REQUEST CATALOG #155B
ON "INDUSTRIAL VACUUM"

The SPENCER TURBINE COMPANY
HARTFORD 6, CONNECTICUT

FACTORY/EQUIPMENT NEWS

Begins on page 108

For more about these items, circle item numbers on Reader Service Card next to back cover.

126—Impulse Sealers have a rapid heating and cooling action achieved by pulsing a thin ribbon of high-temperature alloy with a high current for a short time. Designed for polyethylene sealing, units also work well with Saran and vinyl. Many sizes. *Weldotron Corp.*

127—Heat-Indicating Plates are adhesive-backed. Increments change from pastel to jet black to give positive record of heat exposure from 500 to 1100 F. in 50-deg. steps. Flexible and immune to most ambient conditions, plates adhere until removed. *Pyrodyne, Inc.*

128—Front-End Wheel Loader has a 4-wheel drive, a carrying capacity of 4000 lb., a static lifting capacity of 9500 lb. Four speeds in both forward and reverse, dual clutches, power reversing transmission, 77-hp. gasoline or diesel engine. *Allis-Chalmers Mfg. Co.*

Turn the page

ALLIS-CHALMERS

Imagine! A package this small

contains the spare parts for your Ro-Flo compressor

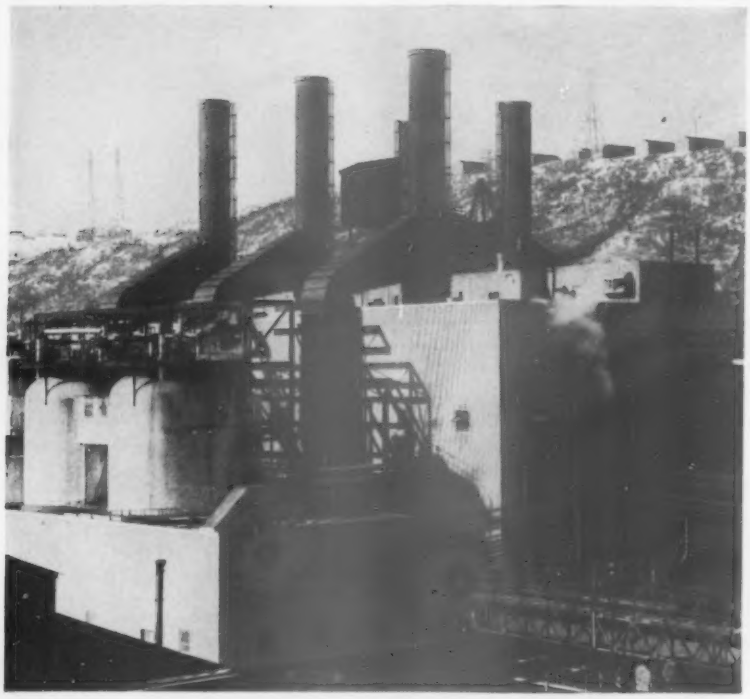
A spare parts kit you can hold in your hand — dramatic evidence of the continuous, trouble-free performance that is yours with a *Ro-Flo* compressor.

You need fewer spare parts because there are fewer moving parts to wear out. No pistons, no valves, no connecting rods. Besides the bearings and seals, which all units have, only the rotor blades are exposed to normal wear, and rotary design compensates for it — automatically, by centrifugal force. Average blade life is two to three years, and when finally worn, blades can be replaced in one simple operation.

Smooth rotary motion of the *Ro-Flo* compressor eliminates the vibration and pounding shock of reciprocating units — and the necessity for expensive, heavy foundations. A slab is enough. Smaller units can be mounted directly to the floor.

Two-stage *Ro-Flo* compressors are built in twelve sizes to handle from 250 to 1800 cfm at pressures from 60 to 125 psig. Single-stage units up to 50 psig, from 40 to 3000 cfm. *Ask your A-C representative for descriptive literature, or write* **Allis-Chalmers,** *Industrial Equipment Division, Milwaukee 1, Wisconsin.* A-1270

HOW HAGAFILM® ELIMINATED $10,000 A YEAR POWER PLANT CORROSION COSTS



Quick case history—reading time 52 seconds

THE PLANT: Large power station serves U.S. Steel's National Tube Division at McKeesport, Pa. Monongahela River water is used for boiler make up.

River water is clarified with Hagan Coagulant Aid and alum, softened with lime and soda ash and deaerated for use in boilers. Desuperheating condensate system was forecast as corrosion weak spot because of high CO_2 in steam. To evaluate cost of maintenance versus treatment, National Tube engineers adopted a "wait and see" policy.

THE PROBLEM: Magnitude of corrosion was almost unbelievable. Standard 1″ x 2″ x 20 gauge carbon steel test strips pitted through within 24 hours. Low pressure heater shells had to be continually patched. Spill-over lines and fittings failed almost weekly. Maintenance costs rocketed to a high of $10,000 a year.

THE SOLUTION: Treatment with Hagafilm reduced corrosion rate from a no treatment level of 1285 to less than 1 mg/dm²/day with a 4 ppm feed; and to a range of 5 to 10 mg/dm²/day with a 2 ppm feed. Present feeding is 3 ppm.

RESULTS: Since introduction of Hagafilm four years ago, no failures have occurred in spill-over system lines and fittings. Corrosion in entire system has been arrested.

National Tube engineers say that Hagafilm treatment has already paid for itself many times over in reduced labor and maintenance costs.

FOR FULL INFORMATION on Hagafilm, write for free Bulletin 410-12-7.

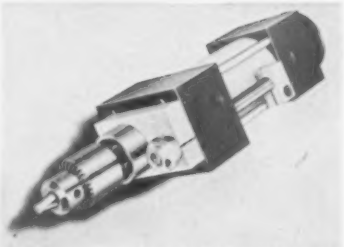
HAGAN
CHEMICALS & CONTROLS, INC.
HAGAN BUILDING, PITTSBURGH 30, PA.

HAGAN DIVISIONS: CALGON CO.–HALL LABORATORIES–BRUNER CORP.

FACTORY / EQUIPMENT NEWS

Begins on page 108

For more about these items, circle item numbers on Reader Service Card next to back cover.



129—Automatic Feed Drill has micrometer stop adjustment that allows operator to maintain depth tolerances to 0.0005 in. Compact, runs on air pressure, has hardened and ground trilobe polygon drive to reduce shock and vibration. Three sizes. *Alkon Products Corp.*

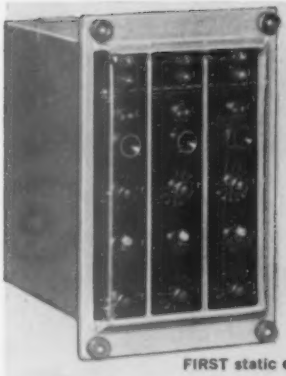
130—Grinding Disk with depressed center is said to cut and remove metal faster than any similar type wheel. Features uniform cutting action and long life. Available in 7- and 9-in. dia., ⅛-, 3/16-, and ¼-in. thicknesses. Low operator fatigue. *Raybestos-Manhattan, Inc.*

131—Alloy Band Saw Blades are said to outlast four to eight ordinary carbon blades, will give a straight-line cut on tough alloy steels. Usable on either standard equipment or automatic cut-off machines, the blades have high wear resistance. *American Saw & Mfg. Co.*

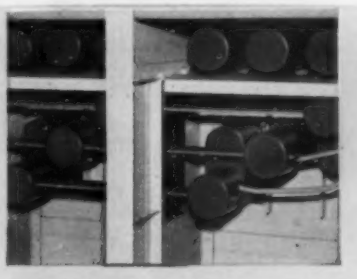
132—Air-Powered Routers give straight or contour cuts through wood, metal, plastic, honeycomb. Features include depth-of-cut adjustment, self-cleaning operation, large front-end bearing to take radial and thrust cutting forces, full-grip collet. *Buckeye Tools Corp.*

Turn the page

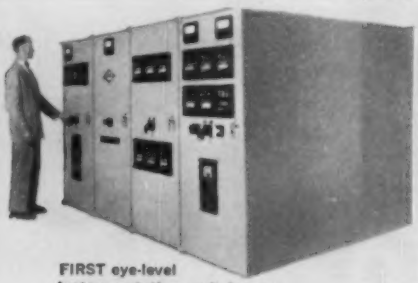
ALLIS-CHALMERS



FIRST static overcurrent relays



FIRST with track-resistant, glass polyester insulation with primary stud and bus joint

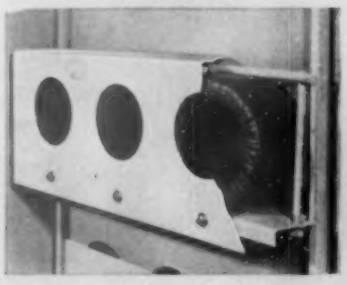


FIRST eye-level instrumentation switchgear

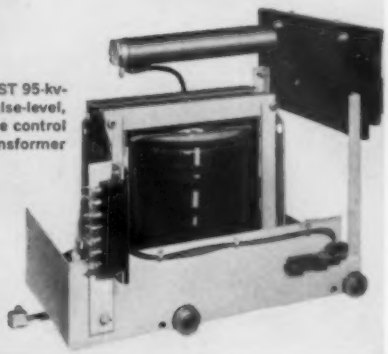
FIRST Aluma-Clad walk-in aisle switchgear

FIRST epoxy-resin potential transformers, trunnion mounted

1ST



FIRST front-access current transformers



FIRST 95-kv-impulse-level, dry-type control power transformer

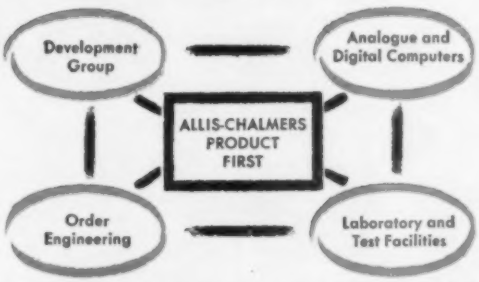
...from the company that put

Progress in Switchgear

For 113 years Allis-Chalmers has built a reputation for the finest products in the industry. A-C is continuously developing new ideas, new techniques and new products to serve you better. This same leadership spirit has quickened the pace of switchgear progress. It's responsible for the firsts illustrated above. These testify to one company's research and engineering *action*.

There are still better things to come in switchgear. You'll get them all when you specify better switchgear ... designed, built and *guaranteed* by **Allis-Chalmers,** Power Equipment Division, Milwaukee 1, Wisconsin. A-1357

Aluma-Clad is an Allis-Chalmers trademark.



Intradepartment teamwork bridges all gaps ... smoothly integrates information, machines and men ... speeding overall progress in Allis-Chalmers switchgear.

YARDS AHEAD!

Barreled Sunlight gives you
measurably more for your money!

You can measure the cost of paint two ways. Price per gallon is the most obvious . . . but least reliable. A far more accurate way to figure it is by the square yard . . . including labor costs which today take 80¢ out of every painting dollar.

Figured this way, it's easy to see why cost-conscious building and maintenance engineers specify Barreled Sunlight Engineered Paints. Their experience shows that a gallon of Barreled Sunlight covers *up to 20% more area* . . . and covers it better! This extra "yardage" is just one of many Barreled Sunlight features. Smooth, dirt-resistant surface is another. Ability to stand up under severe conditions still another. Plus the fact that Barreled Sunlight means *fewer* paint purchases in the long run!

All things considered, Barreled Sunlight Interior and Exterior Paints give you full measure and more for your painting dollars. Learn how much more *now* by writing **Barreled Sunlight Paint Company, 2-G Dudley Street, Providence 1, Rhode Island.**

FILL OUT AND MAIL YOUR COUPON NOW!

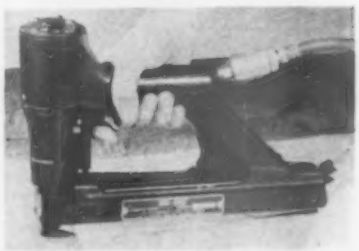
Barreled Sunlight ENGINEERED **Paints**
FOR A BETTER LOOKING, LONGER LASTING PAINT JOB AT LOWER COST

Barreled Sunlight Paint Company
2-G Dudley Street, Providence 1, Rhode Island
Please send me a free copy of your new booklet "How To Reduce Painting Costs".
Name
Company
Address
City Zone State

FACTORY/EQUIPMENT NEWS

Begins on page 108

For more about these items, circle item numbers on Reader Service Card next to back cover.

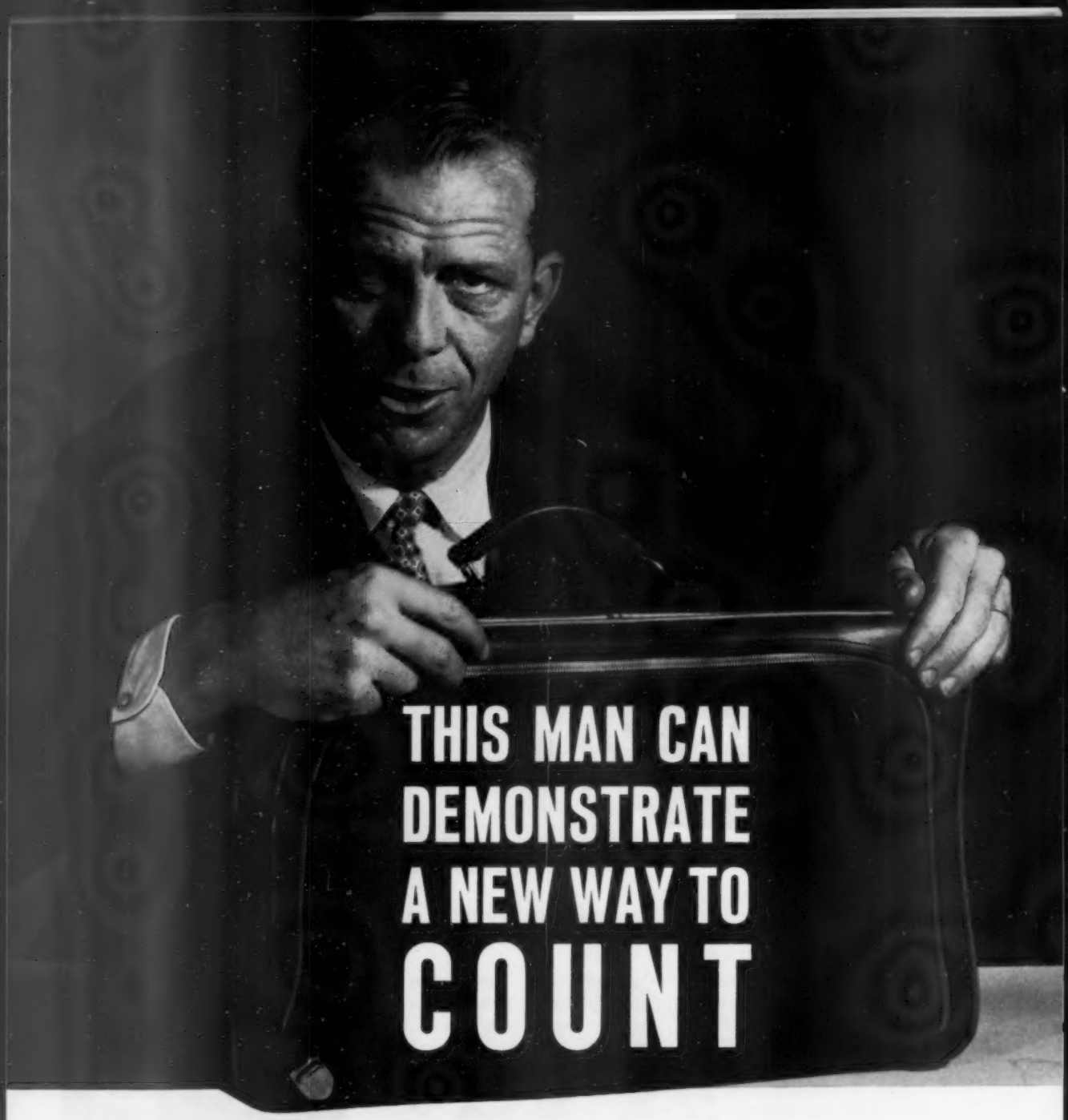


133—Air Tacker drives staples 5/8- to 1-in. long at low air pressures without recoil. The 3-lb. magnesium tacker holds 168 narrow crown staples, features an air lock and a safety-trip mechanism that prevents accidental firing. Loads from side or back. *Fastener Corp.*

134—Silicon Battery Chargers, for lead-acid and nickel-cadmium batteries, control charging current and voltage through a stepless transition from beginning to end. Operate from single-phase power, are for d-c systems from 6 to 120 volts. *Hughes Electronics Co.*

135—Light Band Vernier takes the guesswork out of light band measurement, is used with a monochromatic lamp and optical flat to measure values in millionths of an inch. The anodized aluminum vernier needs no special skill to operate. *Acme Scientific Co.*

Turn the page



. . . right in your own office!

Fifteen minutes of your time — that's all it'll take to put on the Veeder-Root "DESK-TOP DEMONSTRATION" — an actual performance of how Veeder-Root Electronic Counters will improve your production records, improve your product. Let us show you how Veeder-Root Electronic Counters can measure quantities, lengths, liquids; count odd-shape objects; actuate machinery; measure batches. Let us show you new counting methods utilizing Electronic Counters to count, measure, actuate — rapidly, accurately, from remote locations, with complete flexibility, with minimum maintenance.

Make sure you see the Veeder-Root "DESK-TOP DEMONSTRATION". Just call your nearby Veeder-Root branch office or write direct. Your Veeder-Root sales engineer will be glad to put on the demonstration at your convenience.

Veeder-Root
ELECTRONIC CONTROLS DIVISION
DANVERS, MASS.
"The Name that Counts"

Hartford, Conn. • New York • Chicago • Los Angeles • San Francisco • Seattle • St. Louis • Greenville, S. C. • Altoona, Pa. • Montreal • Offices and Agents in other principal cities

For more facts Circle 447 on Reader Service Card

VRO-50

THIS IS AN APEX IMPACT SOCKET
APEX DAYTON, OHIO 5126 13/16
THIS IS AN APEX FAST-LEAD SOCKET
APEX DAYTON, OHIO FL 5126 13/16
and THIS IS WHAT A FAST-LEAD SOCKET DOES FOR POWER TOOL USERS!

The broached opening on an Apex Fast-Lead Socket is designed to lead the socket on to the nut or bolt, engaging completely the instant contact is made.

When you use Apex Fast-Lead Sockets on power tool production operations, you can run down an entire series of nuts or bolts without ever stopping the tool. Because an Apex Fast-Lead Socket "gets on" in one-sixth of a turn, with a single, uninterrupted motion, it isn't necessary to even hesitate just before the socket makes contact. And that goes for multiple power tool units, too.

Apex Fast-Lead Sockets . . . ¼" through ⅝" square drive . . . ⅜" through 1 1/16" broached hex openings . . . short, standard, long and extra long lengths. Catalog 30-A has all the facts—write, on your company letterhead please, for your copy.

APEX FASTENING TOOLS

SCREWDRIVING • NUT RUNNING • SPECIAL

The APEX Machine & Tool Co. • 1023 So. Patterson Blvd. • Dayton 2, Ohio

For more facts Circle 448 on Reader Service Card

FACTORY/EQUIPMENT NEWS

Begins on page 108

For more about these items, circle item numbers on Reader Service Card next to back cover.

136—Portable Drill Stand, operated by a powerful vacuum base, will fasten itself with up to 3000-lb. holding force to any non-ferrous material. A radial positioner provides freedom to rotate drill point 190 deg. and move laterally to 1⅛ in. *Bux Magnetic Products.*

137—Circuit Breaker, with molded case, gives 40% saving in space, yet provides same protection as company's larger model. Magnetic trip adjusts for individual motor protection. In continuous current ratings to 100 amp. at 600 volts a-c. *I-T-E Circuit Breaker Co.*

138—Static Overcurrent Tripper with no moving parts for Type LA low-voltage circuit breakers is self-contained, needs no external source for tripping. Has 80 to 200% variable pick-up. A 600-amp. unit adjusts to trip from 480 to 1200 amp. *Allis-Chalmers Mfg. Co.*

Turn to page 139

For more facts Circle 449 for Strapping, 450 for Framing, 451 for Stitching→

perspectives on productivity

Three plant management men offer their views on how proven ideas from Acme Steel are increasing productivity and lowering costs in vital areas of plant operation.

ACME STEEL

a production supervisor reports on Acme Steel

STRAPPING

"Unitizing and palletizing with Acme Steel Strapping has certainly streamlined our in-plant handling. It's a decided improvement on the old style handling of the wide variety of parts destined for Clark's materials handling, construction machinery and automotive products.

Strapping and powered strapping tools have also helped us raise productivity in shipping. Shipments reinforced with steel strapping not only stay secure during transit but ease the customer's handling job. That's why we ask our suppliers to strap their shipments to us."

Acme Steel Strapping ideas are helping companies in all fields boost productivity in hundreds of ways. These include improved methods for closing, unitizing, bundling, baling, bracing, reinforcing and tying packages and products of any size, any shape. And Acme Steel's broad assortment of strapping tools—automatically or manually operated—offer substantial savings on every type application, no matter how specialized.

Your local Acme Idea Man will show you exactly how.

Ken Metzger, Production Control Supervisor, Clark Equipment Company, Buchanan, Michigan.

ACME STEEL

IDEA LEADER IN STRAPPING

ACME STEEL COMPANY
13515 Perry Avenue · Chicago 27, Illinois

a materials handling engineer reports on Acme Steel **FRAMING**

"Secure and adequate materials storage is vital to the production of our missile launchers. AIM Brand Slotted Angle has solved this problem perfectly. Its pattern of slots and holes is accurately located so any employee can quickly bolt pre-cut lengths together and end up with a really professional job on any design.

This framing material's simplicity and versatility has suggested many other applications. We use it for carts, tables, equipment fixtures, platforms, ladders and even packaging. It has developed into one of our most productive materials."

No other manufacturer offers the application know-how and technical assistance available through Acme Steel with its nation-wide AIM Brand distributors.

Newest development in the Acme Steel framing line is AIM Brand heavy-duty materials storage rack. It ushers in the first positive protection against beam disengagement by fork lift trucks—through a unique safety load locking device*—as well as greater load capacity and stability. Your local AIM Brand distributor has all the facts.

Ralph Samples, Materials Handling Supervisor, Universal Match Corporation, Armament Division, Ferguson, Mo.

ACME STEEL

IDEA LEADER IN FRAMING

AIM® BRAND

ACME STEEL COMPANY
13515 Perry Avenue • Chicago 27, Illinois

* Patent applied for.

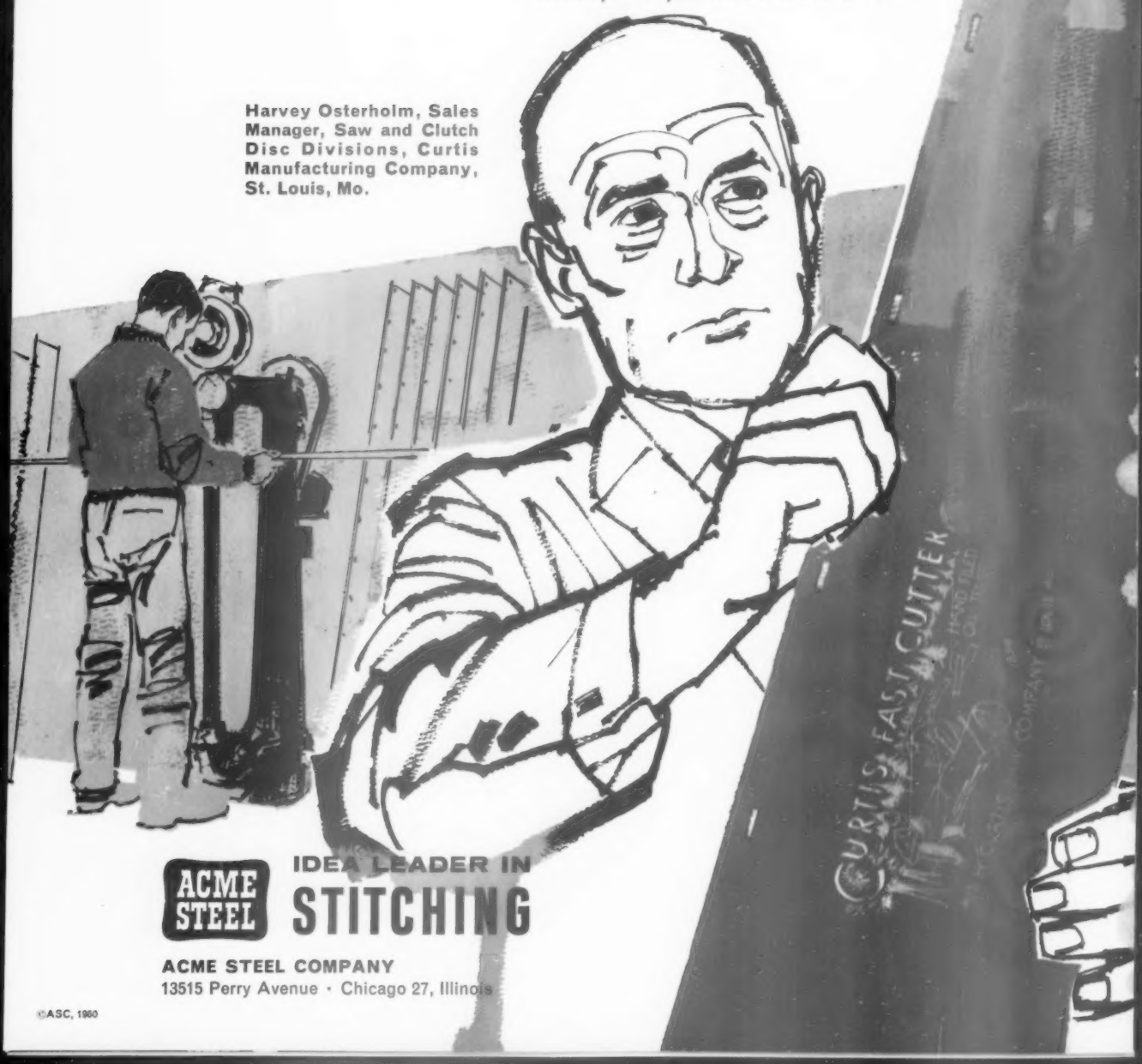
a sales manager reports on Acme Steel

STITCHING

"Packaging quality and cost are very important factors in our competitive sales picture. The saw blades we produce for industrial and agricultural users must be packaged securely, yet economically enough to keep prices attractive. In fabricating and reinforcing our special corrugated containers, we find that Acme Steel stitching methods total out lowest in cost-per-closure. The smooth, nonstop operation of these high-speed machines not only results in better packaging, but eliminates production bottlenecks."

Acme Steel wire stitches are cut and driven with machine-gun efficiency from smooth, continuous coils of wire. No method—not glue, not tape, not staples—equals wire stitches for closure and fastening security and production economy. They ignore temperature and moisture, are unbeatable in strength, uniformity and low labor cost. And *only* Acme Steel manufactures complete lines of both stitching machines and wire—for box closure, book binding or product assembly fastening of virtually any type material. How can wire stitching most profitably increase your productivity? Ask your local Acme Idea Man.

Harvey Osterholm, Sales Manager, Saw and Clutch Disc Divisions, Curtis Manufacturing Company, St. Louis, Mo.



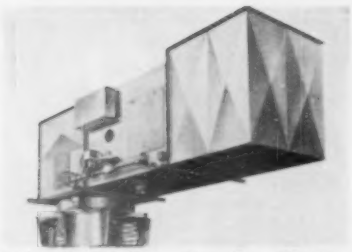
ACME STEEL

IDEA LEADER IN
STITCHING

ACME STEEL COMPANY
13515 Perry Avenue · Chicago 27, Illinois

©ASC, 1960

For more about these items, circle item numbers on Reader Service Card next to back cover.



139—Fresh-Air Supply Heaters provide warmed air to replace loss through exhaust systems. Gas-fired units come wired and piped for connecting to gas and electrical lines. Five sizes, from 15,000 to 50,000 cfm. Several discharge arrangements. *L. J. Wing Mfg. Co.*

140—Solid Industrial Tires are made up of laminated wedges of rubber and fabric that give resiliency to absorb vibration and shock. Said to have exceptionally high traction and braking power, tires are for use in tortuous operating conditions. *Notat Tire Co.*

141—Platform Trucks feature universal caster mounting plates and safety tread plate decks, heavy channel sections, deep handle sockets, reinforced corners. Offered in 1000- and 2000-lb. capacities, in 10 standard sizes from 24x36 in. to 36x72 in. *Magline, Inc.*

Turn the page

Interior view of Goodyear plant shows how Structoglas glazing transmits ample light, tinted and diffused by panels' "Softlite Green" color.

GOODYEAR glazes with Structoglas

For Free Natural Light without Breakage

Why did Goodyear use Structoglas for glazing in its new Akron Rim Plant? These corrugated, shatterproof fiberglass panels install quickly, eliminate glass breakage and periodic painting and puttying of sash – form a weather-tight source of natural light.

Structoglas is press-molded of acrylic polyester resin, resists breakage, fading, discoloration and erosion. No painting needed, because the "Softlite Green" color is molded in the panel. And Structoglas "SE" panels, used in the Goodyear plant, are *self-extinguishing*—approved by Underwriters' Laboratories and Factory Mutual. You can improve lighting and eliminate breakage with Structoglas, the panel that practically pays for itself.

structoglas®

WRITE TODAY for Goodyear Case History and new Structoglas Glazing folder (SL-1). Structoglas Inc., Dept. 703, Cleveland 20, Ohio.

5902

Choice of the wise buyer who compares...

CM HOISTS

CM METEOR ELECTRIC WIRE ROPE HOIST ½ to 5 ton capacities—Compact, enclosed design. Low headroom. Continuous duty motor with thermal overload protection for heavy duty service. Precision bearings and helical gears for long life. Only 110 volts at push button control. Hook suspension; plain, geared or motor driven trolley.

CM LODESTAR ELECTRIC CHAIN HOIST—⅛ to 2 ton capacities—First truly heavy duty version of small electric hoist. ¼ ton model weighs only 51 lbs. Heavy duty self-adjusting brake, plus exclusive regenerative electrical braking. Upper-lower safety limit switches. CM-Alloy load chain. Single and three phase.

HAND OR ELECTRIC CHAIN OR WIRE ROPE

CM makes them all! So you can choose a hoist that's perfectly suited to your specific needs in a compact, rugged and safe CM design.

CM TROLLEYS AND CRANES

CM CYCLONE Hand Chain Hoist—¼ to 10 ton capacities—Easy to carry. One ton model weighs only 36 pounds. Made of tough aluminum alloy. CM-Alloy load chain. High efficiency. Lifetime lubrication.

CM PULLER—"The One Man Gang"—¾ to 6 ton capacities—Lifts or pulls at any angle. Lever handle operation Automatic load brake holds at any point. ¾ ton model weighs only 13 pounds and fits in a tool box. CM-Alloy load chain.

● **FOR OVER 75 YEARS,** Chisholm-Moore has offered hoist buyers the newest and most efficient designs, the most rugged construction, and the greatest number of valuable operating and safety features. CM hoists operate with a very minimum of maintenance. They give years of satisfying service.

Request catalog and name of local stocking distributor.

CM HOISTS

CHISHOLM-MOORE HOIST DIVISION
COLUMBUS McKINNON CHAIN CORPORATION
TONAWANDA, NEW YORK
REGIONAL OFFICES: NEW YORK, CHICAGO, CLEVELAND

In Canada: McKINNON COLUMBUS CHAIN LIMITED, ST. CATHARINES, ONTARIO

FACTORY/EQUIPMENT NEWS

Begins on page 108

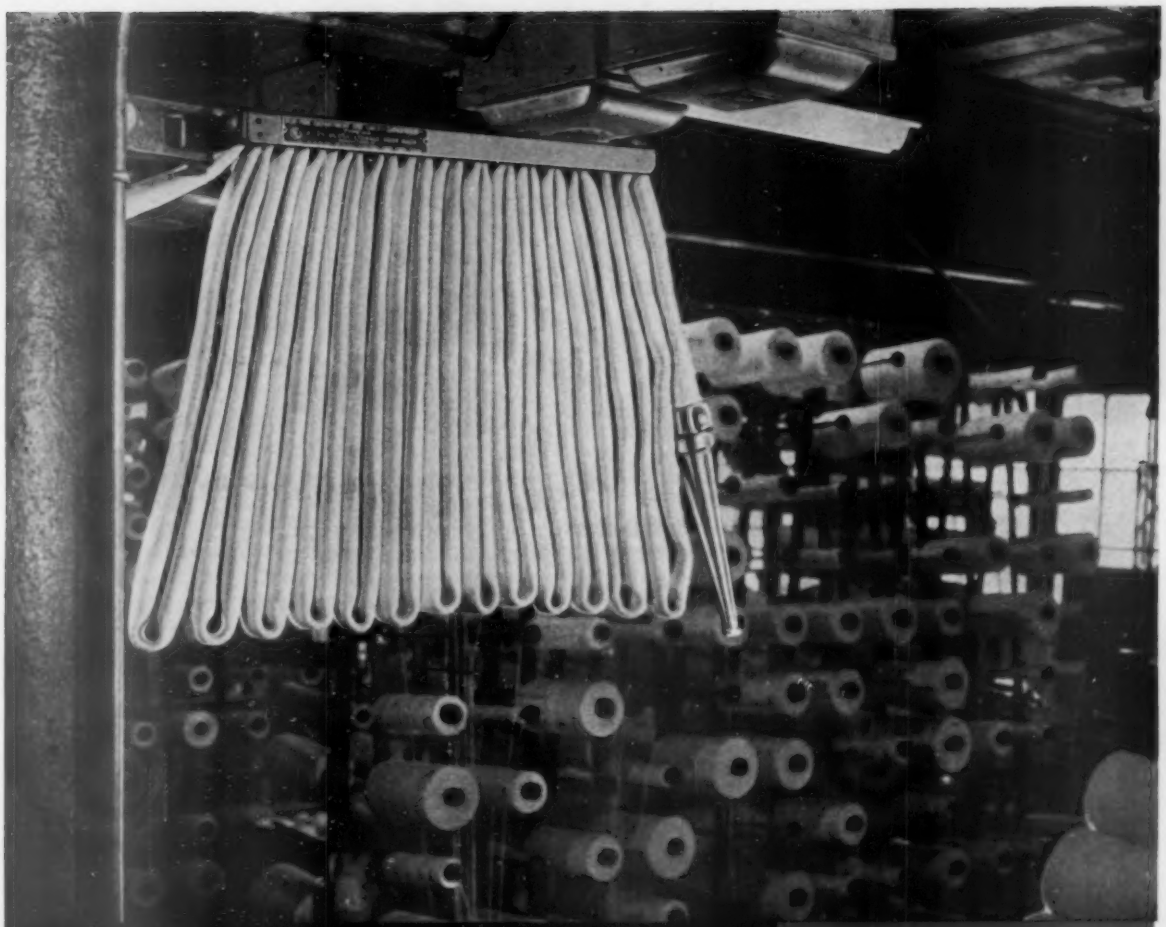
For more about these items, circle item numbers on Reader Service Card next to back cover.

142—Stand-Up Fork Truck weighs 3300 lb., has lift height of 89 in. Capacity is 2000 lb., top speed is 6 mph. Driven by air-cooled 3-cylinder engine (either gasoline or LPG), trucks have single push-pull control for forward and reverse. *Minneapolis-Moline Co.*

143—Portable Canopy offers completely mobile assembly areas and storage shelter at less than $1 per sq. ft. Units on wheels move to job, can be disassembled and loaded on truck in 3 hours. Sizes: 10x20 ft. or 20x20 ft. from 8 to 14 ft. high. *I & B Mfg. Co., Inc.*

144—Staple Remover prevents workers' hands from being scratched by staples that stick out when cartons are merely pried apart. Made of die-cast zinc with a steel welded tip and small enough for a shipping clerk to carry in his pocket. Price: $2.50. *Flash Mfg. Co.*

Turn the page



Is your hose ready to fight a fire today?

Acme-Hamilton's Eze-Pak is always ready and dependable. This hose is specifically built to be folded flat and reeled flat. Will store on all types of racks and reels. Eze-Pak Fire Hose will deliver all the water to the fire—it won't leak to damage costly material and equipment.

FACTORY MUTUAL APPROVED EZE-PAK Fire Hose was developed to meet the needs of industrial fire protection. The rubber tube is loose at the points of fold to prevent cracking. The single jacket of cotton and Dacron* is lightweight, durable and very flexible. 1½" size available in 50, 75 and 100 ft. lengths. Leak-proof, easily dried. Write Acme-Hamilton, Dept. M for information.

* Dupont Trade Name

Acme Hamilton

MANUFACTURING CORPORATION, TRENTON 3, N. J.

Divisions: Acme Rubber Mfg. Co. • Hamilton Rubber Mfg. Corp.

ATLANTA • CHICAGO • DETROIT • HOUSTON • INDIANAPOLIS • LOS ANGELES
MILWAUKEE • NEW YORK • PITTSBURGH • SALT LAKE CITY • SAN FRANCISCO • SEATTLE

ENGINEERING DETAILS MAKE THE DIFFERENCE

At Connors, experienced trackwork engineers design and guide the fabrication of your replacement or new track layouts to assure prompt and precise completion of your order. Every detail is pre-checked to make possible rapid installation at your track site. Contact Connors for:

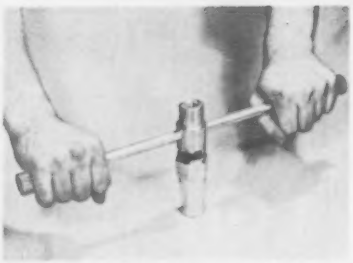
- light rails
- frogs
- switches
- guard rails
- gauge rods
- crossings
- switch stands
- steel ties
- turnouts.

CONNORS STEEL DIVISION
PORTER
H.K. PORTER COMPANY, INC.

For further information or catalog, write:
West Virginia Works, P. O. Box 118, Huntington, West Virginia

142 **Circle 455 on Reader Service Card**

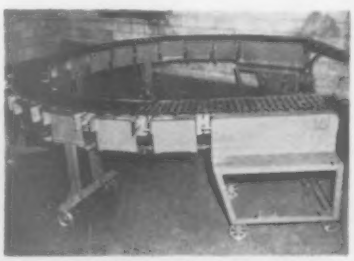
For more about these items, circle numbers on Reader Service Card next to back cover.



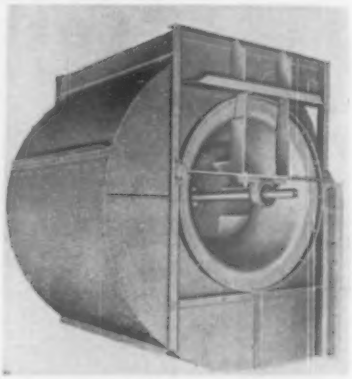
145—Stud Extractor and Driver is for hand or power operation. Available in four sizes. It can remove any stud that withstands torque required to extract it. Collets can be interchanged in less than 30 sec.; provide positive grip, instant release. *E. V. Nielsen, Inc.*

146—Tandem Hydraulic Cylinders consist of two cylinders in line, featuring common head at center and separate pistons mounted on solid rod. For use in space too small for larger bore cylinders. In bore sizes to 4 in., lengths to 80 in.; several mounts. *Allenair Corp.*

147—Electric Motors, from 40 to 250 hp., are designed as auxiliary units for generating stations. Feature a visual inspection window for checking bearing and oil rings; air-gap check holes; oversize conduit boxes for easy lead connections. *Westinghouse Electric Corp.*



148—Flexible Conveyor, with hinged receiving plate, comes in 12- and 18-in. metal belt widths running 42 in. above floor. It bends horizontally on a 5- and 6-ft. inside belt radius. Options include power stacker and reversing belt travel. *R. T. Sheehan Co.*



149—Centrifugal Fans feature a low-velocity radial rim wheel design that allows air to expand over entire blast width and pass over blades at low velocity with minimum turbulence. Blades are double-surface die-formed. Come in 15 sizes. *American-Standard.*

150—Valve to draw water from the bottom of storage tanks has two seats mounted on same stem, is said to be the only valve that lets the operator push on the handle with inner valve closed, outer valve open, to flush out foreign particles. *Johnston & Jennings Co.*

151—Oil Flow Meter measures the rate of flow in hydraulic systems. Attaches quickly, instantly reports flow in gpm. Can be used with high pressures to 1500 psi., and with any viscosity oil. About the size of a cigar box, it needs no timing. *Perma-Weld Co., Inc.*

Turn the page

ONE pump becomes MANY . . . saving you pump dollars . . . giving you a wide range of clear water, non-clog and other liquid-handling modifications . . . when you standardize your pumping operations with Fairbanks, Morse ADAPT-*ABLE* pumps.

F-M ADAPT-*ABLES* consist of a pump frame and simple adapter to which can be attached a wide variety of F-M hydraulic ends with enclosed, semi-open or non-clog impellers. Conversion is easy . . . inexpensive, too.

F-M ADAPT-*ABLES* are *"NEMA-Matched"*: pump mounting dimensions are standardized with similar dimensions of Nema-driving motors. Gone is the need for make-shift height-adjusting blocks and odd-bore couplings!

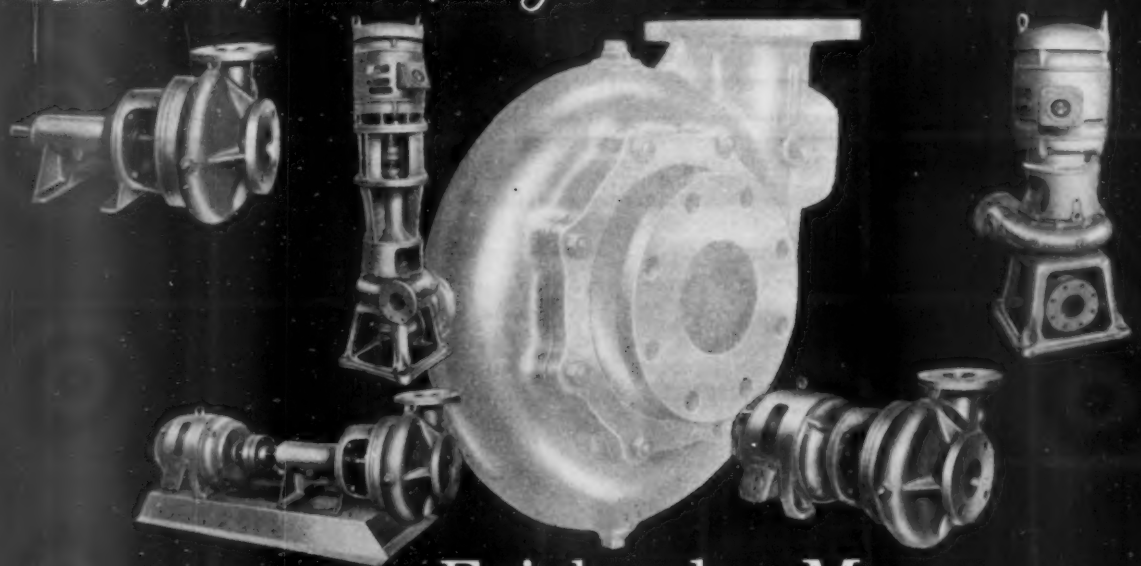
The ADAPT-*ABLE* design means that the most economical frame size may be selected to match the motor horsepower requirements of the pumping job.

And there are other advantages: choice of mechanical seals or conventional stuffing boxes with easy field change-over from one to the other . . . interchangeable bearings for pumps and motors. For special liquid handling problems, hydraulic ends can be specially alloyed to fit the needs: we've been solving such problems for generations.

Regardless of *what* liquids you pump . . . or *where* . . . Fairbanks, Morse builds pumps and *matching* power units for *your* use . . . in a greater range of sizes, types and capacities than *anyone, anywhere.* Start SAVING pump and motor dollars by putting F-M's vast hydraulic experience to work in your plants, process lines and products . . . now!

"nema-matched" adapt-ables

. . . a lot of pumps in ONE package!

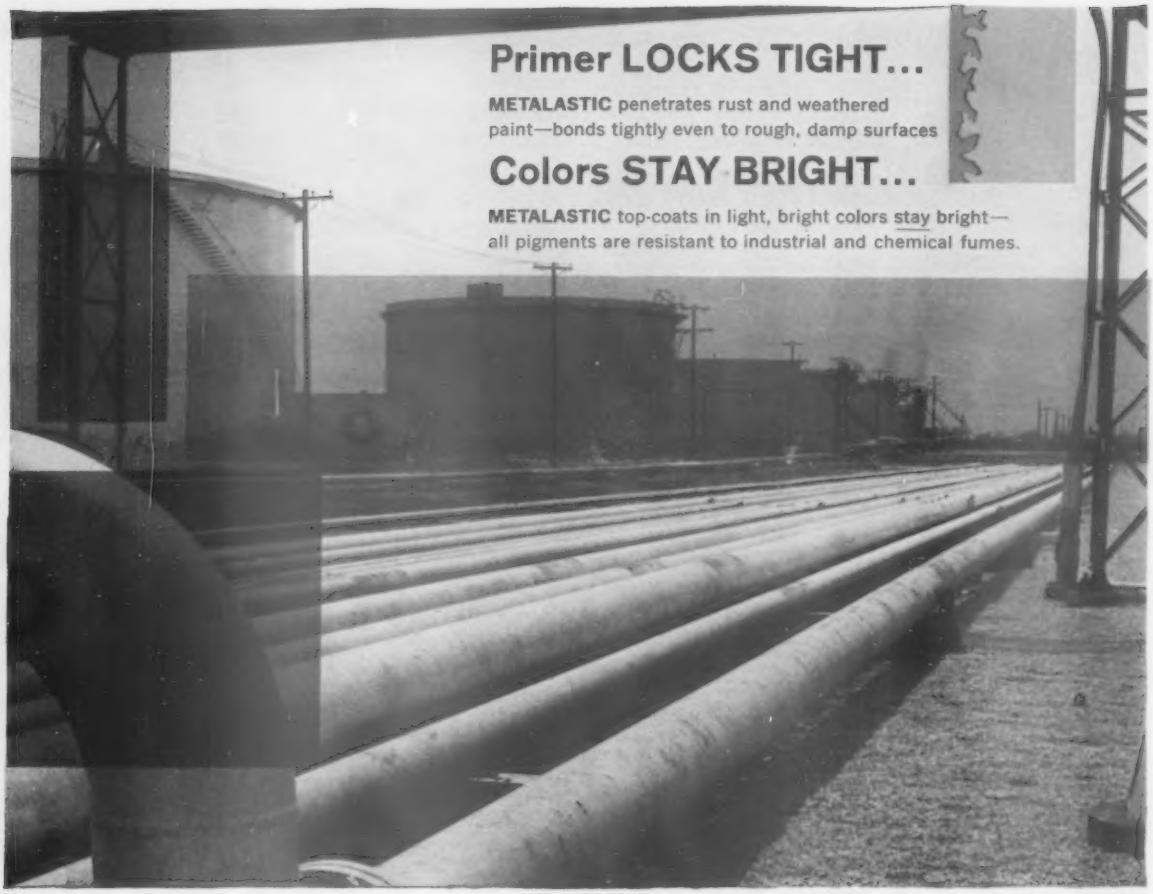


Fairbanks, Morse

THE PROUDEST NAME IN PUMPS

Pump and Hydraulic Division • Kansas City, Kansas

A MAJOR INDUSTRIAL COMPONENT OF FAIRBANKS WHITNEY CORPORATION


Primer LOCKS TIGHT...
METALASTIC penetrates rust and weathered paint—bonds tightly even to rough, damp surfaces
Colors STAY BRIGHT...
METALASTIC top-coats in light, bright colors stay bright—all pigments are resistant to industrial and chemical fumes.

Metal STAYS PROTECTED...with METALASTIC!®

Here's new, deep-penetrating protection against rust—a new, brighter future for buildings and equipment!

Sherwin-Williams METALASTIC Primer and Enamel now offers even longer-lasting protection . . . more adaptability to adverse surface conditions . . . lighter, brighter, cleaner colors that stay light, bright, clean!

METALASTIC Primer, with FOUR protective pigments, gives rust-inhibitive action not possible with red lead or any other single pigment. Special built-in "wetting" action penetrates and holds on rough surfaces, over tight rust, or even where surfaces are damp. METALASTIC Enamel gives new, long-lasting gloss and color retention that brings down costs per year for all hard-to-reach exposed metal areas.

METALASTIC finishes as well as Sherwin-Williams industrial quality maintenance finishes for special needs, are conveniently available through Sherwin-Williams Branches in all principal cities. Call or write The Sherwin-Williams Co., Industrial Maintenance Division, Cleveland 1, Ohio, or Montreal, Canada.

☐ Send booklet "How To Save"

☐ Send more facts on METALASTIC

Name_____

Company_____

Address_____

City_____

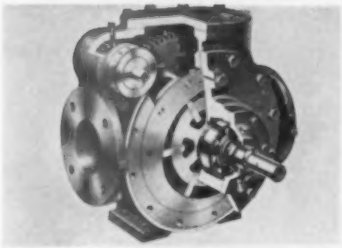
How to Save SAFELY When Painting Your Plant

This free booklet tells how . . . shows *what* to use *where*. Send for it, together with more facts on METALASTIC.

SHERWIN-WILLIAMS

MAINTENANCE FINISHES

For more about these items, circle item numbers on Reader Service Card next to back cover.



152—Variable Flow Pumps make it possible to dial any desired flow rate from zero to full capacity without changing the pump speed, allow the use of standard speed motors for power. In three sizes (2, 3, and 4 in.) with capacities to 450 gpm. *Blackmer Pump Co.*

153—Pick-Up Broom, for all makes of hydraulic loaders and forklift trucks, has a 6-cu.-ft. hopper. Broom attachment cleans a 5-ft. path, has optional sprinkler system and gutter brush to sweep along walls and parking barriers. Hydraulic motor. *Sweepster, Inc.*

154—Safety Saw, with an air-cooled head, features an oscillating blade that cuts hard surfaces without damaging skin or clothing. Eliminates danger from broken blades or chips from material being cut. For wood, plastics, plaster, metal, rubber, or textiles. *Stryker Mfg. Co.*

Turn the page

Radio messages to your key personnel directly and privately!

. . . with MOTOROLA transistorized Radio Pager

A problem comes up. A key executive is needed on an important matter, a maintenance man is needed to make a repair on the line—now! He's "somewhere in the building" . . . but no one knows exactly where.
With Motorola Radio Paging, you can contact him in seconds—here's how: The switchboard operator sounds a tone in his Radio Pager (and his only). He is alerted instantly. He presses the button on his Pager and hears the full voice message. Total time elapsed. . . . just seconds . . . and he's on his way to where he's needed. Executives, engineers, supervisors, maintenance men—all get their messages on Radio Pagers that slip in the pocket or clip to the belt . . . cutting costs by increasing everyday efficiency and meeting emergencies faster.

MOTOROLA HANDIE-TALKIE Radio Pager

"Handie-Talkie" is the Registered Trademark of Motorola Inc.

MOTOROLA COMMUNICATIONS & ELECTRONICS, INC.
a subsidiary of Motorola Inc.
4501 Augusta Blvd., Chicago 51, Ill.

Please send me full facts on Radio Pager ☐
Have representative call for appointment ☐

NAME_____ TITLE_____
COMPANY_____
ADDRESS_____
CITY_____ ZONE____ STATE_____

For more facts Circle 458 on Reader Service Card

GO-GETTER CUTS COSTS IN HALF; MAKES JOB SAFER

A leading chemical plant faced with the double explosion hazard of ethylbenzene fumes and aluminum chloride dust, solved its material handling problems – and saved money in the process – through the use of Revolvator's new fork lift trucks labeled Type Ex by Underwriters' Laboratories for Class 1 Group D explosion hazardous areas.

Previously, two men with a hand truck were required for this operation. Since the introduction of the Explosion Proof Go-Getter, one operator easily charges the hoppers in a safe manner with a minimum effort. "What used to be a dangerous, disagreeable job has now become a simple task," says the plant manager.

The explosion proof Go-Getter, available in 12 standard models, is but the latest development in Revolvator's better than a half century of experience in materials handling equipment covering standard walkie lift trucks, hand lift trucks, portable elevators and related equipment.

REVOLVATOR CO.

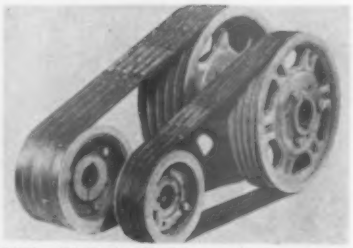
8761 TONNELE AVENUE, NORTH BERGEN, N. J.

SINCE 1904

FACTORY / EQUIPMENT NEWS

Begins on page 108

For more about these items, circle item numbers on Reader Service Card next to back cover.



155—V-Belt Drives, designed to provide greater hp. capacity with less bulk than conventional models, are narrower without sacrificing sidewall contact area. Oil resisting and static conducting to dissipate static electricity. *Fort Worth Steel & Machinery Co.*

156—Motorized Speed Reducer has horizontal right-angle drive, is powered by a 1/20-hp. or 0.035-hp. motor, and provides a full range of output speeds from 43.8 to 350 rpm. Standard mounting bracket permits reducer to be used in many positions. *Boston Gear Works.*

157—Bench Center for production-line inspection of machined parts, stampings, assemblies, is adjustable from 0 to 10 in., has a fixed removable head center and a locking quick spring travel on the tail stock center. Uses standard indicator rods. *Quality Gage Co.*

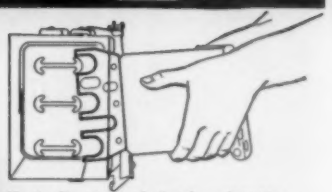
158—Storage Rack System can be installed without tools, has a load-locking fastener. Made with 3x3-in. columns, 1½-sq.-in. channel sections as bracing. Keyholed slots on face of column permit adjustment of beams on 2-in. centers. Capacity: up to 15 tons. *Acme Steel Co.*

Turn the page

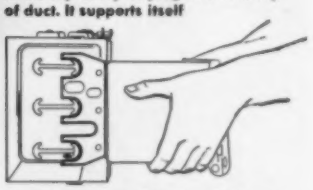
Why SQUARE D ALUMINUM PLUG-IN DUCT?

Because you want a duct that's rugged—built to thrive on heavy duty—*plus*

PLUG-IN UNITS GIVE YOU EXCLUSIVE *hook-swing* MOUNTING



Hook clip at top of plug-in unit to top of duct. It supports itself



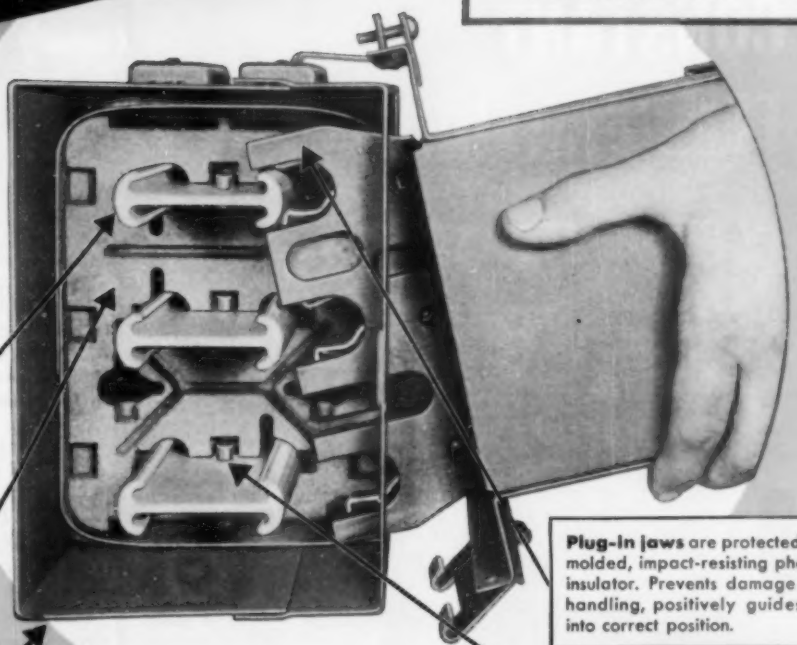
Then, just swing plug-in unit down until jaws engage bus bars

Hanger mounting (*not shown*) makes installation easy. A universal hanger permits mounting in *any* position. Just suspend and level top portion of hanger, then clip on lower portion. U.L. approved for 10-foot spacing.

I-beam construction of bus bars—a Square D exclusive—provides four times the strength of conventional bus bars. Bars are zinc, copper and silver-plated full length.

Full width bus support provides greater strength on short circuits, freedom from vibration. Also acts as fire stop where duct passes through walls and floors.

Square D duct is totally enclosed for maximum safety—no danger of accidental shorts. Prevents overheating from dust accumulation.



Plug-in jaws are protected by a molded, impact-resisting phenolic insulator. Prevents damage from handling, positively guides unit into correct position.

Steel pins in each bus bar prevent bars from shifting and support them on vertical riser installations.

With other plug-in duct, it's no easy job to mount the plug-in units. In fact, it takes a lot of real pushing which is neither safe nor easy when you're working on a ladder. With Square D's exclusive *hook-swing* mounting, you just hook the plug-in unit to the top of the duct. Then, simply swing it down and in until the jaws have engaged the bus bars. No awkward pushing required—no unnecessary chances to take. Compare Square D's rugged, heavy-duty construction with any other. It costs no more—why settle for less?

Write for Bulletin SD-110. It gives the facts on Square D aluminum plug-in duct. Address Square D Company, Mercer Road, Lexington, Kentucky

SQUARE D COMPANY

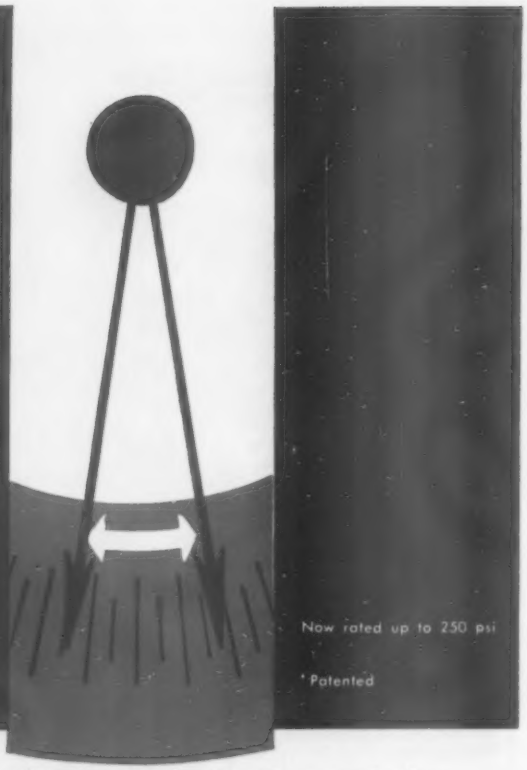
wherever electricity is distributed and controlled

NEW

MULTI-ZONE*

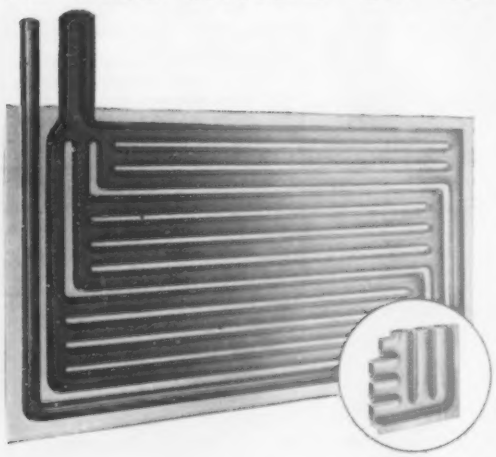
PLATECOIL®

FASTER START-UP, CONSTANT TEMPERATURES



The new MULTI-ZONE design cuts "downtime" and compensates for intermittent overload in a wide range of tank and process heating applications. Multiple headers and multiple condensate returns provide for FREE-FLO action — with practically instantaneous distribution of steam to all levels of the plate. Condensate "trapping" is held to a minimum. This gives the new MULTI-ZONE PLATECOIL a reserve capacity to deliver under overload conditions during "start-up." It also produces extremely fast recovery of tank temperature with minimum variation.

IN ALL KINDS OF TANK AND PROCESS HEATING



Operating Pressures up to 250 psi — DURAWELD bonding of the plates and mill-controlled TRANSTEEL in standard units have boosted PLATECOIL pressure containment rating up to 250 psi. This makes the time-proven advantages of PLATECOIL applicable to many types of heating where 250 lb. steam is required. Destruction tests have demonstrated a safety factor of 5 to 1.

Low Installation and Maintenance Costs. — PLATECOIL costs are low compared to the cost of engineering, fabricating, installing and maintaining pipe coils. Lightweight, compact PLATECOIL simplify installation. Greater heat transfer per sq. ft. of surface permits smaller units which save valuable tank space. Streamlined surfaces cut cleaning costs. Integral, factory fabricated construction eliminates threaded joints (in the solution) to corrode or leak. All stainless steel and alloy PLATECOIL units affected by cold working are annealed and pickled after fabrication to return the metal to its original condition and thus eliminate the probability of corrosion due to internal stresses and carbide precipitation.

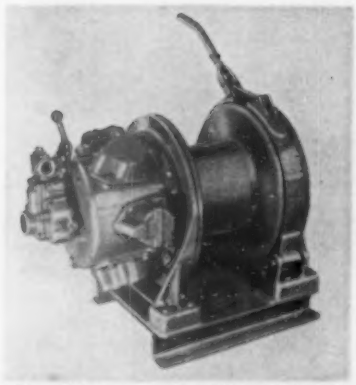
Write for NEW PLATECOIL Bulletin P60 for more data.

Tranter Manufacturing, Inc.

LANSING 9, MICHIGAN

PLATECOIL® DIVISION

For more about these items, circle item numbers on Reader Service Card next to back cover.



159—Air-Powered Utility Hoists, in two models with 5000- and 7000-lb. capacity, are equipped with 6-cyl. reversible air motors, operate at 80 psi., and have optional controls for remote operation. Drum capacity: 600 ft. of ⅝-in. wire rope. *Ingersoll-Rand Co.*

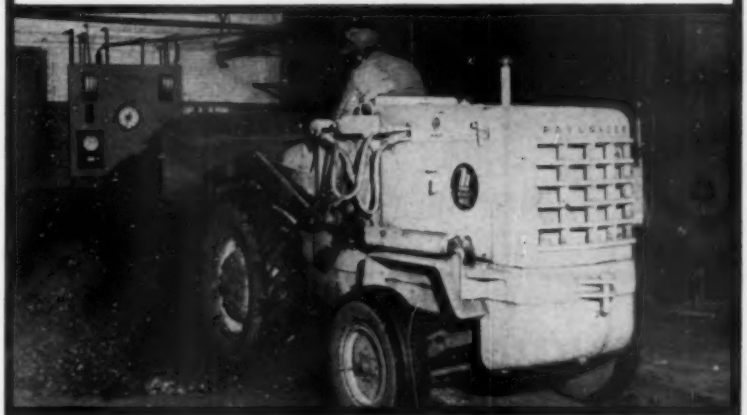
160—Transparent Plastic Shield protects plant guards and parking lot attendants from rain, snow, and sleet. Also cuts down loss of heated air from booth. For permanent installation or mounting in sheet metal framework. Shatterproof. *Industrial Metal Fabricating Co.*

161—Rollout Load Break Switch, fused, has metering compartment at top. Safety shutters isolate disconnects from operator. Quick make-break mechanism gives constant blade speed despite handle movement speed. Rated at 5 and 15 kv. *Allis-Chalmers Mfg. Co.*

Turn the page

PAYLOADER® coal-handling

Outside and Inside



The versatility of "PAYLOADER" tractor-shovels on all kinds of industrial materials handling work has also made them favorites for coal handling operations at many industrial power plants—to carry from stockpiles to hoppers, load trucks, build stockpiles, spot cars, load-out ashes.

Maintenance work too. Many plant and yard maintenance departments have their own "PAYLOADER" for both inside and outside work. They transport equipment, excavate, grade, landscape, level, load-out waste, level waste dumps, maintain private roadways and parking lots, plow and load out snow.

A size to fit your need. "PAYLOADER" units are available in many operating capacities—from 2,000 to 12,000 lbs.—and dumping heights up to 15 feet. Numerous attachments are also available, such as snow plows, pick-up sweepers, crane hooks and fork lifts, that further increase "PAYLOADER" usefulness for plant and yard maintenance.

Your nearby Hough Distributor who sells and services "PAYLOADER" units is ready to help you discover how these proven tractor-shovels can be applied, with profit, to many and varied operations.

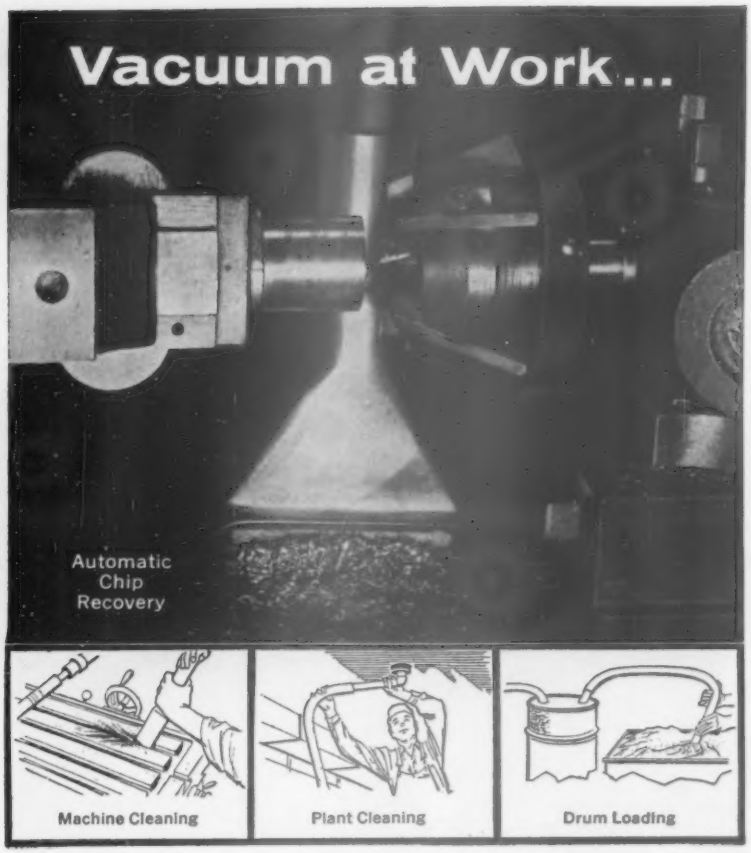
HOUGH®

THE FRANK G. HOUGH CO.
755 Sunnyside Avenue
LIBERTYVILLE, ILLINOIS
SUBSIDIARY — INTERNATIONAL HARVESTER COMPANY

Send me "Industrial Materials Handling the PAYLOADER Way"

Name
Title
Company
Street
City State

7-A-2



INVINCIBLE Units May Solve Your Problem!

Flexible Invincible vacuum equipment recovers, reclaims, processes, conveys. It will handle metals, liquids, lint, gases—virtually anything that can be passed through a vacuum line.

Vacuum created by Invincible units may be brought to the point of application on wheels or through pipe. Portable machines can be taken off production work during off periods and used as vacuum cleaners, thereby controlling health, fire and explosion hazards.

Capable of continuous operation, rugged Invincible equipment has solved hundreds of production problems, reduced costs and simplified the design of automatic machinery. Over 150,000 Invincibles are currently in use . . . 5,000 are in their 35th year of service.

There are 28 different standard Invincible models, plus special machines and other combinations, ranging from ½ to 10 H.P. More than 50 years of experience in vacuum application are available. Resident engineers in principal cities. Accurate free surveys can be made on short notice.

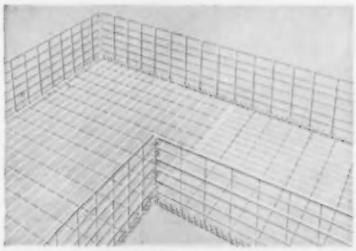
Write us for detailed information concerning *your* problems.

INVINCIBLE VACUUM CLEANER MFG. CO.
DOVER, OHIO

FACTORY/EQUIPMENT NEWS

Begins on page 108

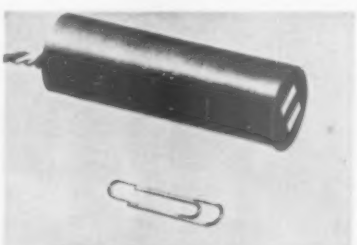
For more about these items, circle item numbers on Reader Service Card next to back cover.



162—Steel Mesh Conveyor Guards come in 8-ft., ready-to-install sections. Lightweight steel mesh is 2x4 in., welded at all intersections. Side heights from 1 to 4 ft. are available. For straight or inclined runs, 90-deg. turns. *Springport Steel Products Co.*

163—Computer System, Univac III, is a solid state instrument with 25% more efficiency and a processing speed nine times that of its predecessor—Univac II. Its card reader operates at 700 cards per minute, its printer at 700 lines per minute. *Remington-Rand.*

164—Close-Quarter Scaler, specifically designed for maintenance departments, is a heavy-duty, valveless percussion tool for removing scale, rust, and paint. Operates on 9 cfm. of air and delivers 4700 blows per minute. Weight: 3½ lbs. *Cleco Air Tools.*

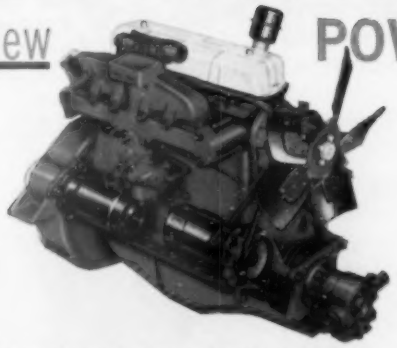


165—Proximity Switch, for control of automatic machines, combines a life span in millions of cycles with repeatability within 0.001 in. Shock-resistant, it costs only $17.50. Rated at 6-amp. current at 110 volts resistive load, 3 amp. at 220 volts for nominal life. *Tann Corp.*

Turn the page

3 NEW F series
ALLIS-CHALMERS LIFT TRUCKS

with new POWER-CRATER engine



Unique crater-shaped piston head in POWER-CRATER engine, built by Allis-Chalmers, sets up violent swirling turbulence, thoroughly mixing fuel and air. Because of this proper mixing, a higher percentage of fuel is transformed into useful energy. Thus, Allis-Chalmers F series lift trucks effect substantial savings in fuel.

POWER-CRATER and POWER-SHIFT are Allis-Chalmers trademarks.

Outstanding working ability and convenience

- Power, balance and weight distribution to climb steep grades
- Roller channel steel masts for smooth, fast lifting
- Simple, "easy-to-turn" steering, one-lever gear shift
- Pivoted steer axle for smoother riding, positive traction
- Comfortably wide, adjustable, ventilated-cushion seat
- Familiar automotive-type controls, key starting switch
- Positive, safe braking — two systems: large two-directional hydraulic brake, mechanical parking brake
- Solid 2" x 5" bar-steel, heavy-duty frame—foundation for long life and dependability
- Easy serviceability—seat tilts up for easy access to engine, clutch change in only 30 minutes, counterweight quickly removed
- Replaceable wet cylinder liners in engine save time and money
- Optional transmissions — standard or POWER-SHIFT drive

Let your dealer show you how new F series trucks *do more, save more.* Send for new bulletin BU-640. Allis-Chalmers, Milwaukee 1, Wisconsin.

BH-142

ALLIS-CHALMERS

POWER FOR A GROWING WORLD

For more facts Circle 464 on Reader Service Card

VALDURA DURAWEAR

Higher in Solids—gives higher film build . . . cuts maintenance painting costs

Money-saving Durawear not only has top color and gloss retention, it gives extra protection to surfaces for many years. Featuring a linseed oil modified alkyd vehicle, Durawear has better brushability than straight alkyd enamels. It is very easy to paint on irregular surfaces since the consistency prevents running off from sharp corners. Use Valdura Durawear on steel, wood or masonry—indoors or out—as illustrated above, on fire escapes, wall surfaces, storage tanks, and wherever protection from elements of weather is desired. Available in five attractive colors.

VALDURA
PAINTS THAT ENDURE

Please send me complete information and color chips on Valdura Durawear.

VALDURA HEAVY DUTY PAINT DIVISION
AMERICAN-MARIETTA CO.
101 E. Ontario St., Chicago 11, Illinois

NAME_____

COMPANY_____

CITY_____ STATE_____

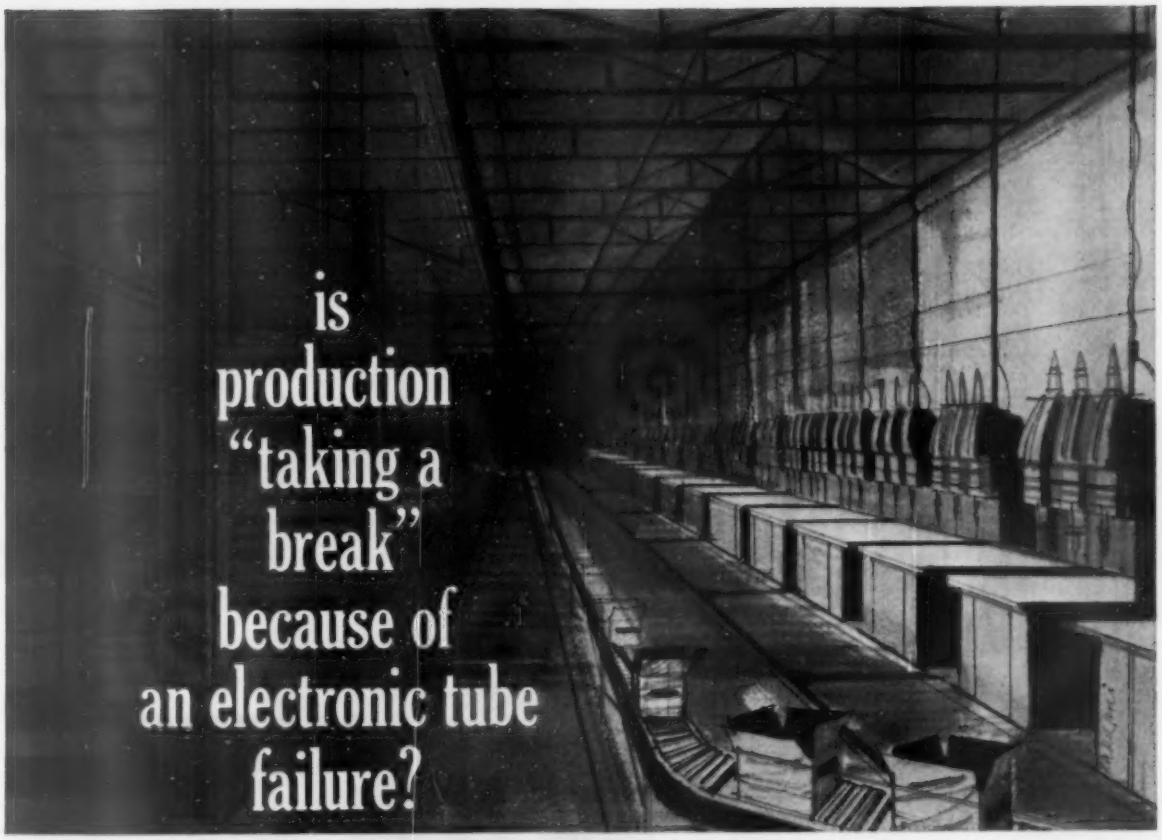
Begins on page 108

For more about these items, circle item numbers on Reader Service Card next to back cover.

166—Flaw Detectors "see" up to ½ in. below surface to spot defects. In two models, stationary unit has 6000-amp. d-c output. Detects bad welds, grinding, forming and fatigue cracks, etc. Mobile unit (3000 amp. a-c and d-c) is for large rough parts. *Picker X-Ray Corp.*

167—Vibration Test Machine simulates bumps, jars, and weaving that are typical of railroad freight cars and motor trucks. For use as quality control unit for vibrating assembled parts to determine weaknesses in assembly and design. Capacity, 400 lb. *L. A. B. Corp.*

168—Tube-Cooled Motors, with air-to-air heat exchange, come in enclosures for hazardous or non-hazardous locations. Function well in environments with excessive moisture, oil vapor, chemicals, alkalies, dust, sand, and dirt. To 2000 hp. *Louis Allis Co.*



keep your line moving with Sylvania Electronic Tubes

There's a rugged Sylvania Tube for practically every industrial electronics job, including yours. Thyratrons, Ignitrons, Voltage-Regulator and Voltage-Reference Tubes—all are built to stand up under constant duty in critical industrial control applications.

Keep production efficiency high. Reduce maintenance and down time. Replace with quality-assured Sylvania Electronic Tubes—they are available promptly from your Sylvania Industrial Tube Distributor. Ask him for the descriptive "Sylvania Industrial Tubes" booklet. Or, write Electronic Tubes Division, Sylvania Electric Products Inc., Dept. 247, 1100 Main Street, Buffalo, N. Y.

POPULAR SYLVANIA THYRATRONS

Type	Peak Inverse Anode Volts	Peak Cathode Amps	Average Cathode Amps
2D21	1300	0.5	0.1
414	2000	100.0	12.5
610	500	0.4	0.1
624	2500	80.0	6.4
627	5000	2.5	0.64
628	2500	8.0	2.0
629	350	0.2	0.04
632B	1500	30.0	2.5
672A	2500	40.0	3.2
676	2500	40.0	6.4
677	10000	15.0	4.0
678	15000	6.0	1.6
884	350	0.3	0.075
885	350	0.3	0.075
2050	1300	1.0	0.1
5557	5000	2.0	0.5
5559	1000	15.0	2.5
5560	1000	15.0	2.5
5685	1250	77.0	6.4
5796	1500	20.0	1.6
6011	1250	30.0	2.5

SYLVANIA

Subsidiary of **GENERAL TELEPHONE & ELECTRONICS**

For more facts Circle 466 on Reader Service Card

"K&M" KAMWALL

BEND IT . . . AROUND CORNERS AND OVER OBSTRUCTIONS!

STAPLE IT . . . OR NAIL IT WITHIN ¼" OF EDGE!

SAW IT . . . WITH AN ORDINARY HAND SAW OR SCORE IT WITH A KNIFE!

Unique new "K&M" KAMWALL gives you all the advantages of an asbestos-cement structural sheet and then some! It conforms to irregular surfaces and foundations . . . permits unusual design and architectural effects. KAMWALL is ideal for tile floor underlayment, for fireproof interior partitions, fire barriers, furniture, plus 101 other applications where fire, vermin, dampness, and rot may be a problem. Its smooth surface makes it readily adaptable to all types of finishes. Painting enhances its beauty. And KAMWALL is so workable, all fitting and cutting is easily done on the job with ordinary carpenter's tools. KAMWALL can be stapled . . . or nailed close to its edge without predrilling. It permits light, narrow framing members. Such workability saves labor, time . . . reduces on the job breakage. Write today for a sample of KAMWALL and additional information. Get all the facts—fast! Keasbey & Mattison Company, Ambler, Pa. Dept. B-3870.

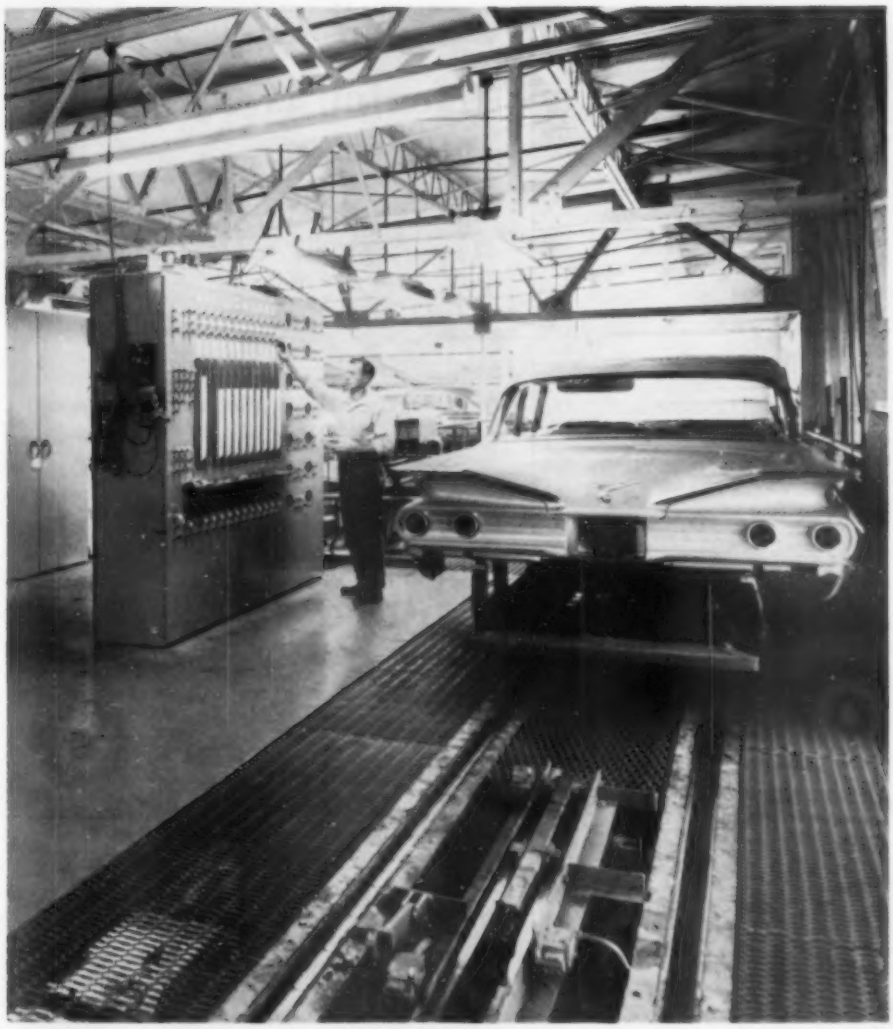
K·M
BEST IN ASBESTOS

KEASBEY & MATTISON at Ambler

For more facts Circle 467 on Reader Service Card

FACTORY

PLANT OPERATIONS
CASE BOOK



STORAGE WITH A MEMORY

This board not only assigns the auto to a spot on Chevrolet's storage line, but also controls exact moment for its transfer to the exit conveyor . . . page 158

TABLE OF CONTENTS FOR THIS SECTION ON NEXT PAGE ►

FACTORY CASE BOOK

NORMAN H. SOLON, EDITOR

No. 33 July 1960

Machine Is Own Housekeeper 156
Adjustable Drive Peps Up Buffing 156
Consulting on Safety 156
Assembly-Line Thinking Solves Job Shop Problems 157
Fushbutton Storage With Memory 158
Collapsible Bags Collapse Costs 158
Dial Direct for Fast Calls 158
Stretching Space With Side Loading 158
Magnetic Rollers Support Production 159
More Light, Less Glare 159
Spot-Checking Autos 159
Cleaning by Sound 159
Picks Up Coils Fast But Gently 160
Human Booby Traps 160
Noise Reduction Works in Reverse 160
Small Town Digs Deep 160
Glow Shouts Safety 160
Mechanical Tricks Boost Output 161
65 Years in Plant Feeding 162
Test Spots Poor Insulation 162
Key Hazards Guards Can Find 162
Mobile Pump Rig Checks Valves .. 162
Steel Sheets Snub One Another 163
3-in-1 Machine Chops Costs 163
Pegboard Cabinet 163
Seeing Daddy Work 164
Putting Finger on Gang Drilling 164
No Bouncing From Job to Job 164
Blue-Collar Workers Get Their Say 164
Three Ways to Efficiency 165
Coffee Cups Roll to Windows 165
The Payless Holiday 166
Fast Wrapper Speeds Bundling 166
Handling Odd Shapes 166
Giant Press Has 7000-Ton Grip 166
Steel Casing Doubles as Template 167
Puts Everything in Its Place 167
Case Book Capsules 167
Bright Buckets Bury Butts 168
Quenching Drowns Heat Hazard .. 168
Streamlined Package 168
Moving Expenses Are Plant's Headache 168
Plant Devices Are on the Beam 169
Cleans by Suction 170
Removing Burrs Fast 170
One-Time Handling 170
Fuel Cells May Replace Batteries 170

Machine Is Own Housekeeper

Milling machines actually clean up after themselves at Convair Division (Fort Worth, Tex.), General Dynamics Corporation. As well as keeping the manufacturing area neat, it saves valuable man-hours formerly spent on cleaning up metal chips and shavings.

The plant-built cleaning device consists of a vacuum hose attached directly to the cutting edge of the milling machine. The chips are sucked up through the tube, cut into tiny pieces in a chopper, and deposited in a bin outside the plant. There they are picked up by the salvage company.

The system not only saves time and money but also eliminates the possibility of hand injuries through manual handling of the scrap.

Two milling machines normally throw out some 24,000 pounds of chips per month.

Adjustable Drive Peps Up Buffing

A buffing machine with adjustable speed drive has accelerated operations at General Electric Company's Paterson, N. J., plant. It's saving some $5000 per year.

Buffing of small gears in the past was done with a constant speed drive. But the machine's inability to vary speed created a problem in compensating for brush wear.

The new adjustable speed drive has reduced brush wear, eliminated prolonged buffing. The brush maintains optimum peripheral speed, which permits uniform pressure to be placed against the brush—as well as a uniform time cycle.

Consulting on Safety

A joint management-union safety committee has nipped potential disputes in the bud at Goodyear Tire & Rubber Company, Akron, Ohio. The group sits whenever there's a misunderstanding about a safety situation in the plant.

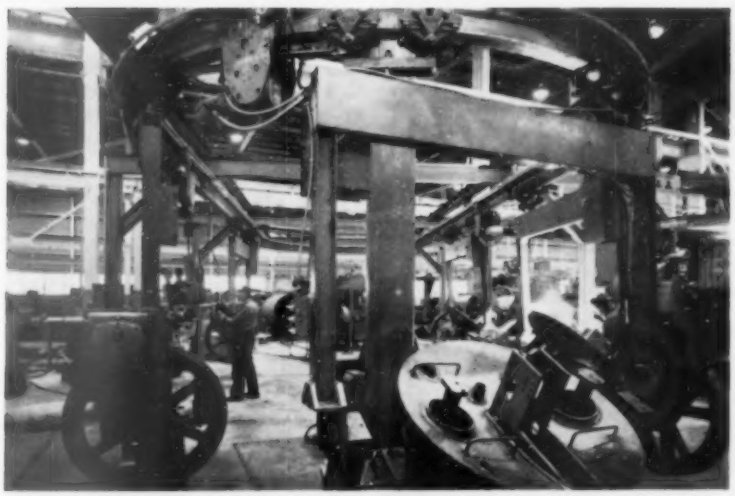
For example, when fumes given off by a newly developed cement irritated workers' eyes, the committee recommended steps to alleviate the situation. In such cases, the union group has the option of calling in an inspector from the State Division of Health and Safety.

This means of negotiation has eliminated the need for costly labor arbitration and the threat of wildcat strikes.

1. L-SHAPED DOOR. Icy winds and drafts are no longer a major problem now this crane door has been installed.

Assembly-line thinking solves job-shop problems

at Westinghouse Electric's Trafford, Pa., plant. And pays big dividends. This 900-employee plant's yearly output is only 1800 units—heavy, expensive circuit breakers. But it's using volume production methods. Four examples:



2. CARROUSEL CONVEYOR. This five-station monorail conveyor moves heavy pieces around the plant, tilts them at any angle in any direction for easy welding.

3. MANHOLE TEMPLATE. Steel ring that is to be welded around a manhole opening controls the movement of this oxyacetylene cutting torch.

4. PAINTER'S CAGE. No more climbing on ladders to paint hard-to-reach areas with this operator-controlled lift suspended from a crane.

1. L-shaped door fights cold. There's no need to interrupt production during cold Pennsylvania winters, when icy blasts invade the plant through an open crane door. The crane enters the plant through an L-shaped door causing a minimum of discomfort. One section of the door folds into the ceiling while the other swings down and in.

2. Heavy parts ride carrousel. Heavy parts that before were handled on stationary fixtures are now given the assembly-line treatment. Parts are suspended from a five-station monorail conveyor for various welding operations. The operator, by pushbutton, can tilt the assemblies as needed for downhand welding.

3. Manhole dubs as template. The actual steel ring that is next to be welded into position around a manhole opening in a tank wall acts as a template for the cutting of the hole. It controls the radius of cut of the oxyacetylene cutting torch. This assures a perfect fit—no discrepancies caused by variations.

A second template controls the in-and-out motion of the cutting head, so the flame is always at proper distance from the tank wall.

4. Cage gives painter a lift. This cage gives a painter mobility to reach all areas of the assembly without the time-consuming job of setting up ladders or scaffolding. The lift is suspended from an overhead crane and is completely controlled by the painter himself—making the job a one-man operation.

This method is speedy and popular with the workers. According to the foreman, the job of caged-in painter is one of the most sought-after in the plant.

(For more about this assembly-line job shop, see pages 70 to 73.)

Cover Story

PUSHBUTTON STORAGE WITH A MEMORY

By the push of a button, one man assigns incoming car bodies to one of 11 parallel storage conveyors at Chevrolet Division (Janesville, Wis.) of General Motors Corporation. After he has scheduled a body for a particular storage line, it is transferred to a storage conveyor that passes the rows laterally. When the body reaches the right storage line an electro-mechanical memory unit triggers a circuit that arranges for its discharge. At the same time, a second memory unit indexes the sequence in which the body will automatically leave storage at a predetermined moment and be transferred by exit conveyor to the assembly department. The system was manufactured by Cutler-Hammer, Inc., Milwaukee, Wis.

Collapsible Bags Collapse Costs

Bulk handling of resin is saving some ten grand a year over the old system at General Electric Company's Bridgeport, Conn., plant.

Vinyl is received at the plant in large collapsible rubber containers (U. S. Rubber Company, New York City), unloaded by fork lift, and immediately emptied into hoppers. The empty bags are then collapsed and returned to the vendor.

In the past the resin was delivered to the plant in paper bags, and unloaded by hand. The bags were then stored, taking up valuable space. Waste caused by handling frequently ran as high as 3%.

The new system is much faster, eliminates waste, cuts down sharply on manpower needs. Also, the company saves about 0.25 cent per pound on the resin by buying in bulk.

The collapsible bags have a capacity of about 5 tons of vinyl each. They're made of rayon cord fabrics and synthetic rubber compounds.

Dialing Direct Gets Calls Through Fast

From the outside you can dial any one of 3500 extensions without going through a central switchboard in Union Carbide Corporation's new building in New York City. You simply dial LL 1 and the extension of the person you're trying to reach. No call is ever delayed. The building still has a centralized switchboard but it now has a much reduced workload.

The numbers within a given section, such as sales, are arranged in sequence. If a person wants to call an assistant manager at LL 1-4567 and the line is busy, the call automatically switches to his secretary on LL 1-4568. If that number is busy, the call is connected to the next highest number. This way the caller is assured of reaching somebody functionally connected with the person he wants to speak to.

The new system also eliminates the sometimes troublesome problem of trying to transfer incoming calls to another line. And having the call disconnected if you click too hard. Just pressing a button on the phone receiver and hanging up causes a light to flash on the central board. The operator then takes over.

Stretching Space With Side Loading

Palletization doesn't necessarily call for wide storage aisles. At Tappan Company's plant (Mansfield, Ohio) aisle space measures only 40 inches, allowing no room to maneuver fork trucks.

A side loading device mounted on a walkie fork truck does the trick. The operator simply moves the fork truck to the correct rack and a 12-in. platform (which can be moved to either right or left) reaches out to pick up the material. Platform

then returns—with the material—to position on the truck.

When the platform is raised to reach an item on a top shelf, the operator rises with it, so he can observe and control the movement of the platform.

The new system permits the storage of twice as many items in 15% less space. Truck and platform are made by Moto-Truck Company, Cleveland.

Magnetic Rollers Support Production

Cutting of steel sheet to specified dimensions has been greatly simplified at Corey Steel Company's Chicago plant. A series of non-electric magnetic roller channels installed behind the shear does the job. This device has eliminated a number of manual handling operations. It also assures a high degree of accuracy for the operation.

Formerly, the sheet protruding from the shear had a tendency to sag with its own weight on its way to the back gage. This meant a worker had to hold the steel against the gage to obtain accurate dimension and a true cut.

With the new device, a sheet of any size steel is grasped by the magnetic rollers as it emerges from the shear. These rollers can be raised or lowered to handle either broad or narrow sheets. The sheets are held firmly horizontal, guided swiftly to the face of the back gage, and rigidly supported throughout the shearing operation.

The roller channels (Eriez Manufacturing Company, Erie, Pa.) consist of numbers of permanent rollers built into steel channels.

More Light, Less Glare

Glare has been reduced in the drafting room of Lockheed Aircraft Corporation's Marietta, Ga., plant—despite raising of the light level from 65 to 150 foot-candles. Reason: installation of polarizing light panels (Owens-Corning Fiberglas Corporation, New York).

These panels have cut fatigue of the draftsmen considerably—especially of those doing overtime work.

No maintenance has been needed in the 12 months the panels have been installed. Fixtures are equipped with 40-watt fluorescent lamps.

Las Vegas System Spot-Checks Autos

Guards at Ethyl Corporation's Houston, Tex., plant make like Las Vegas croupiers when it comes to spot-checking cars authorized to park within the fenced area of the plant. A gum-dispensing machine plays the part of a roulette wheel. Here's how it works:

The gum machine, filled with black and white marbles, is placed at the main gate. When a car exits from the plant, a patrolman works the lever to produce a marble. A black marble means the car is spot-checked, white means the driver is waved on. The marbles are immediately dropped back into the top of the machine. There are 295 white marbles to 95 black ones.

Company officials say there is no employee resentment of the system. And no one can complain of bias in selection of autos for spot-checking. The method is speedy, leaves no room for argument—the little balls tell the story.

Cleaning by Sound

Ultrasonic cleaning of air capacitors pays twin dividends at Johanson Manufacturing Corporation (Boonton, N. J.). It eliminates maintenance of cleaning equipment and is twice as fast as before.

Parts used to be soaked in boiling detergent, then were swabbed to remove all contaminants. After rinsing, the parts were dried with an air hose. The joker in this method was that delicate parts were often damaged. Also, the high-pressure air sometimes deposited as much dust as had been eliminated in cleaning. And it returned moisture from the air line.

Now, there's a minimum of handling. Small parts are racked and lowered into the volatile cleaner and larger parts held by wire or tongs. After a few minutes the parts are rinsed and left to air dry. Result: speed and no damage.

The ultrasonic system is manufactured by Bronson Ultrasonic Corporation, Stamford, Conn.

Picks Up Coils Fast But Gently

Nobody has to hold his breath now when heavy metal coils are transported at Somers Brass Company, Waterbury, Conn. Damage to the thin edges of coil has been virtually eliminated by this special grab (American Forge & Manufacturing Company, McKees Rocks, Pa.). It transports, lifts, and tilts coils from horizontal to vertical and *vice versa* in about 45 seconds.

The grab has cut handling time by as much as 90% for some operations. And its stacking ability has doubled available warehouse space.

Under the old system, up-ending or down-ending of coils was a constant problem. Damage frequently resulted when conventional grabs were used. The new device, however, is tilted until the crane hook is over the balance point of the coil. There is no edge damage in lifting since the unit is balanced. Once the coil is in the air, the motor is again activated to tilt the coil to a horizontal position.

The device saves time because it can pick up a coil that's lying down or standing up, re-position and transport it simultaneously.

The grab has two motors—one applies an initial grip on the coil, one operates the tilting mechanism.

Human Booby Traps

You may have a human booby trap working in your plant. Medical personnel at Eastman Kodak Company, Rochester, N. Y., claim that certain people are rust-prone—cause rust to form when they touch metals with their fingers.

These individuals perspire heavily and a touch of their digits will leave high amounts of chloride ions that trigger off corrosion. Workers in this category may have health problems, such as diabetes or emotional sweating.

The Kodak doctors say plants can take preventive measures by providing cool working environments and an ample water supply. Companies should urge employees to wash their hands frequently and avoid excessive salt intake. The use of anti-perspirants might also be beneficial, the doctors suggest.

Noise Reduction Works in Reverse

A little noise goes a long way at York (Pa.) Division of Borg-Warner Corporation. Its new sound and vibration laboratory intensifies sound to obtain needed data.

The actual working areas of the new Reverbatorium consist of two high-density poured concrete chambers cast together and supported by steel springs. This eliminates any interference from surrounding sound vibrations. The rooms are constructed without parallel walls and are of different sizes so frequencies of high resonance won't interfere with accurate measurements of sound and vibration.

Small Town Digs Deep

A small town of 15,000 population raised $32,000 in just two weeks to purchase a 47-acre site for the erection of a multi-purpose industrial building. A civic organization, Claremont (N.H.) Industrial Parks, Inc., has offered to provide full plant facilities to the industry that moves in.

The money was raised as a joint community venture to attract industry to Claremont, when the city budget could not provide the funds.

Glow Shouts Safety

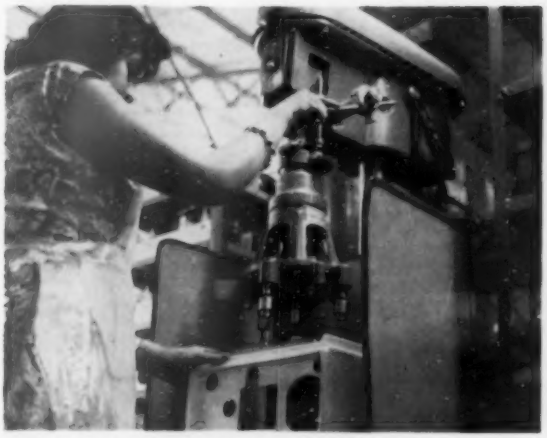
Accident hazards can't be missed at Timken Roller Bearing Company, Canton, Ohio. Equipment is coated with daylight fluorescent paint that provides high-visibility brightness to make safety color coding more effective.

Fork-lift trucks, straddle carriers, railroad gates, fire hydrants, and helmets worn by ground men who direct crane operations are all painted. Trucks are a bright orange that almost shouts at the onlooker. They glow like neon. Overhead beams are yellow and safety equipment, such as hydrants, are red.

The job of coating a fork truck with fluorescent paint (Switzer Brothers, Inc., Cleveland), including cleaning, priming, and overcoat, takes about 10 hours. It's handled by company personnel.

1. RAILROAD TRACK ASSEMBLY.

2. LEARNING WHILE DOING.



3. FOUR-IN-ONE DRILLING.

4. LOOK MA, NO HANDS!

Mechanical Tricks Boost Output in Mexico

Skyrocketing labor costs are far from being a strictly state-side phenomenon. And the U. S. has no monopoly on industrial ingenuity. At Radio Impulsora, Mexico City, alert management has parlayed a dash of imagination into a 40% increase in production. And increased the quality of its product.

A few simple mechanical short cuts made the difference. Little capital was spent on new equipment, no new employees were hired.

Here are four of the profit-making ideas:

1. Moving on rails. Assembly lines are set up in elongated U's with metal tracks to guide radio units around. This is common in the auto industry, but unusual for smaller products. Units are placed in a metal jig that fits the tracks. First operator sets the speed of the production line on a timing device. Later in the day, when operators are somewhat fatigued, the leadman slows down the device. This makes for fewer rejects.

2. Sample tells the story. Throughout the assembly line, each operator has a sample of the way the radio is supposed to look when she has finished her particular job. This chassis is suspended in front of her (arrow), has each piece she is to work on clearly marked.

This eliminates difficulties normally encountered when operators change jobs. Minimum training is required—almost anybody can fit anywhere along the line after a few minutes' instruction.

3. Drilling four at a time. A multiple drill head was adopted to drill all four holes in the plastic cabinet at once. The body slides into a fixed metal sleeve clamp and the operator just pulls down the drill to make it operate. Each drilling job used to take 15 seconds (or one minute for all). Now the entire job is done in five seconds. And with the clamp jig set-up more uniformity is achieved.

4. Busy feet, free hands. The company converted hand-operated machines to pedal control by means of inexpensive air-pressure drives. This gives operators use of both hands to handle the metal pieces. Results: Rejects have dropped considerably, production rate has tripled, and workers experience little or no fatigue.

65 YEARS MAKE THE DIFFERENCE IN PLANT FEEDING

In-plant feeding is old stuff to Norton Company, Worcester, Mass. It has been a company fringe benefit for 65 years.

Vanished are the waiter service and the handle-brush mustachios that prevailed in the company's dining room of the nineties. Today some 4800 servings a day are handled in one administration and five blue-collar cafeterias. All feeding functions are handled by the cafeteria department, which operates as an independent unit of the company. In charge is a manager who reports to the manager of personnel.

The cafeteria department does its own buying, collects its own accounts, keeps its own cost records. One third of the cost of operation is subsidized by the company, while the rest is borne through sales to employees. Periodic open house is held to allow workers to inspect the kitchen facilities.

Test Sees Through Poor Insulation

The exact instant when coil insulation under production testing fails is pinpointed by a test set at General Electric Company's Schenectady, N. Y., plant.

The motor-operated, variable-voltage control raises to a specified voltage at 500 volts per second. It then stops and a timer measures the testing cycle. Next, it returns to 0 voltage position and de-energizes itself.

If the coil insulation under test fails, voltage control automatically returns to the 0 voltage position and de-energizes. A red signal flashes on and the failure voltage remains recorded on the kilo-voltmeter.

The test set is rated at 25,000 volts and is mounted on a rubber wheel truck for easy mobility.

Key Hazards Plant Guards Can Spot

Want to get the optimum benefit from your plant security force? Pinkerton National Detective Agency, New York City, suggests your guards be on the lookout for these 15 key hazards:

1. Slippery floors.
2. Tripping hazards, such as hose lines or piping.
3. Inadequate warning signs at excavations and manholes.
4. Poorly lighted stairs.
5. Aisle or obstructions blocking access to fire equipment.
6. Overheated motors.
7. Loose or broken wires.
8. Open fire doors.
9. Running motors not in use.
10. Defective scaffolding.
11. Leaks or unusual fumes.
12. Broken windows or doors.
13. Dangerously piled supplies or equipment.
14. Missing entrance-exit lights.
15. Loose hand or guard rails.

Mobile Pump Rig Checks Valves Fast

A mobile pump rig makes quick work of hydrostatic testing of valves and other equipment at Mobil Oil Company's East St. Louis, Mo., refinery. The plant-made device is used wherever water and air connections are available.

The unit consists of a horizontal air-operated hydro-pneumatic pump with a capacity of 7330 psi., mounted on a rubber-wheeled cart.

The pump (Aldrich Pump Company, Allentown, Pa.) is operated

by plant air at 90 psi. It's used mainly at turnaround time when many valves are inspected, rebuilt if necessary, and then tested for leaks under hydrostatic pressure. Relief valves are also hydrostatically tested for correct operation.

The portable pump is connected to a test stand on which the valves are mounted. Hydrostatic pressures ranging from 125 to 250 psi. are created. This enables the maintenance staff to spot leaks instantly, and to adjust relief valve springs to precision setting for specific design pressures.

Major benefit of the system is speed. Since the pump is air-operated, pressure is built up to the required level in seconds. For volume testing of valves, this method is much faster than hand pumping.

Steel Sheets Snub One Another

Use of a sheet steel separator has reaped double benefits at the New York plant of Cutler-Hammer, Inc. The device uses a magnetic force to separate the sheets without any effort by the worker.

It has cut labor costs 25%. And it has reduced to a minimum the danger of hand injuries, which were numerous when workers had to pry 16- and 18-gage steel sheets apart by hand.

The separator (E. V. Nielsen, Inc., Stamford, Conn.) sets up a magnetic field that causes the sheets to repel one another and the top sheets to fan out with a uniform air space between them. As the top sheet is removed, the sheets below automatically move up.

3-in-1 Machine Chops Costs 87%

One machine does the job of three at Drain Enterprises, Addison, Ill. This shop-designed adaptation of standard industrial tools incorporates the functions of three tools—a drill press, a drill press with tapping attachment, and a cut-off machine—into one automatic machine. Two men tending five of these machines produce as much as 15 men working with individually operated tools—a cool 87% reduction in production costs.

The machine was set up by installing two spindles of 14-in. drill presses (Rockwell Manufacturing Company, Pittsburgh) on a cut-off machine table plus a motor-driven cam feed and actuating system.

The spindles are placed on top of a regular die set block with springs to return spindles after each operation. The tapping spindle is on a spring floating mount that facilitates entrance of the tap in the drilled hole. There is also a spring to return the cut-off machine arm. The feed mechanism advances the extrusion to a stop at the beginning of each cycle.

The cam shaft is mounted over the tools in an angle-iron frame. The first cam actuates the feed device, the second the drill-press spindles, and the third the cut-off machine. The finished part drops through the table to the box below. One motor, mounted on the angle-iron frame behind the tools, drives both spindles from a two-step pulley.

Cams are changed for various-size extrusions. Blade sizes in the cut-off machine may also be changed —three sizes are used.

PEGBOARD CABINET

This plant-made pegboard cabinet allows Taylor Fibre Company, Norristown, Pa., to store cams still hanging on the pegboard. This eliminates the sorting of cams tossed into boxes. It also provides easy storage for large or odd-shaped cams.

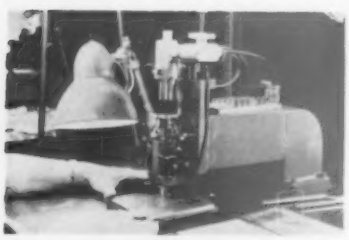
Seeing Daddy Work

There's nothing new in a company holding periodic open house for workers' families. But Magnetic Metals Company, Camden, N. J., holds open house during working hours. And it's proving an excellent tool for recruiting sons of workers.

A boy can see his father actually working on a job, which helps to stimulate his interest in the company. Open house is held in two shifts so all workers' families have an opportunity to attend.

For safety reasons the open-house tours are broken down into small supervised groups. While one group sees one section of a plant, another views a special orientation movie on manufacturing operations.

Any production loss due to the tours is more than compensated for by the impressions made on young potential employees.



Putting the Finger on Gang Drilling

Five boards can be drilled in one operation at Librascope Division (Glendale, Calif.) of General Precision, Inc. It's done with a semi-automatic in-plant devised system (photo). The set-up consists of a special positioning finger above the table, and an electrically controlled drill below the table.

The operator gangs five boards by placing them in a special metal plate fixture with plastic backing. The boards are placed face up on the drill table and the operator guides the finger along the drilling pattern. As the finger drops into each indentation in turn, the operator touches a toe switch and the drill goes into operation.

The drill is automatic, rising at a controlled rate and spinning at a pre-set speed. All five boards are thus drilled at the same time, and the drill bottoms in the reinforced plastic backing of the fixture. When the stroke is completed, the drill returns to the rest position and the operator guides the finger to the next indentation.

No Bouncing About From Job to Job

Eight is the key figure in motor maintenance at the Milwaukee plant of the Chicago, Milwaukee, St. Paul and Pacific Railroad. This figure represents both the number of motors that can be stripped in one day and the number that can be rebuilt in the same period.

With this information in hand, the company is able to schedule motor repair work on a production-line basis—except for emergencies. This makes the most efficient use of its labor force.

The company waits until eight motors have accumulated before breaking them down. Progress of repairs is charted with colored tags on a wall-mounted board—red tags for frames, white for armatures. As soon as eight of each category show up together in the ready-for-assembly column opposite eight motor serial numbers, the assembly line goes into operation.

Under this system workers do a full day's job when they're called for motor repair work. There's no shifting back and forth from one job to another with consequent loss of production.

Blue-Collar Workers Get Their Say

There's a direct line of communication between the blue-collar worker and top management at Hotpoint Division (Chicago) of General Electric Company. Each hourly rated worker has a definite five-step appeal procedure open to him whenever he feels he has a legitimate gripe. And in all cases he receives an answer to his complaint.

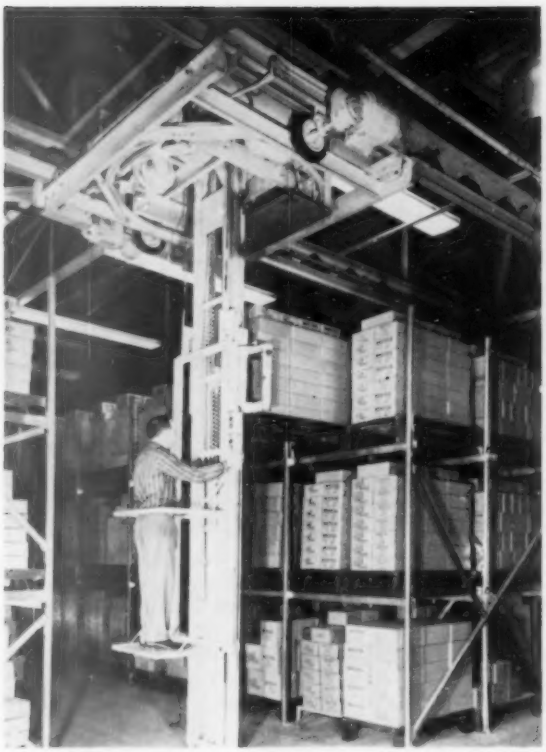
Under this system an employee can take his complaint initially to his foreman or supervisor, who is required to answer it within two days. If the employee is not satisfied, he can appeal verbally or in writing within five working days to the plant superintendent or to the manager to whom his foreman reports. A meeting between the superintendent and the worker is then arranged, and within a further five days the employee is notified of the second decision.

If he still has a complaint, he can appeal for hearings to the manager of manufacturing for his department and then to the manager of labor relations. In both cases he receives answers within five days after these meetings.

A worker's highest level of appeal is to the manager of relations and utilities, who is a direct representative of the company's general manager. A meeting with the relations manager is set up and within reasonable time the worker receives a final decision in writing on his complaint.

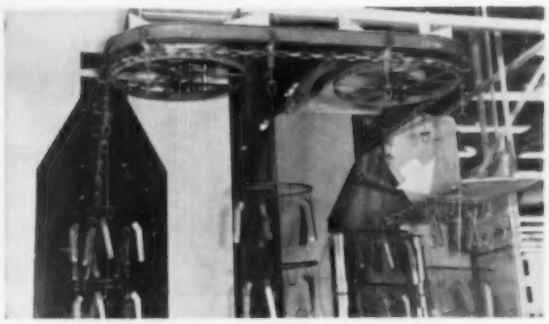
JULY CASE BOOK

Small parts handling can be a headache to any plant—especially when volume ranges into the millions. At Parke-Davis & Company, commercial machinery combined with clever in-plant devices solved the problem.



1. CRANE MOVES LIKE POGO STICK.

2. ORANGE MEANS "LOOK OUT."



3. SAWTOOTH KEEPS PARTS DRY.

Three Ways to Efficiency on the Move

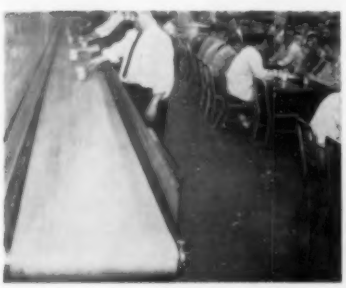
There's no single road to material-handling efficiency. Management must be alert enough to adopt a program custom-geared to meet plant demands. And be flexible enough to improvise when occasion dictates. At Bostitch Company, East Greenwich, R.I., a bucket of paint and a piece of lumber, plus sophisticated cranes are proving excellent tools in providing a safe, fast, productive handling system.

Here are three typical examples:

1. Beating the space barrier. This crane (Louden Machinery Company, Fairfield, Iowa) solved the problem of narrow aisles in the stockroom area. All items can be palletized, even though there's no room for fork trucks. By pushing a button, an operator can move the crane up and down and across the entire stockroom—even make it do a complete 360-deg. turn. It serves five aisles and a 15,000-sq.-ft. area.

2. Orange for danger. A bright orange doormat in front of all doorways and entrances to the manufacturing area eliminates accident hazards—such as a worker dashing from a door into the path of an oncoming fork truck. The orange doormat warns a driver, when he's approaching an opening, to slow down and drive with extra caution.

3. Shaking them dry. This simple wooden sawtooth device (arrow) shakes the trapped droplets of liquid from the recesses of parts on the conveyor rack leading from chemical spray booth to oven. It replaces the time-consuming manual job of shaking the moisture loose. Costs next to nothing to make, needs no employee supervision.



Coffee Cups Roll to Service Windows

A 60-ft. cafeteria conveyor is proving its worth at Motorola Inc., Franklin Park, Ill.

Like most large plants with eating facilities, Motorola was faced with congestion toward the end of lunch periods or coffee breaks. Large groups of employees all wanted to deposit cups, dishes, and trays at the service windows at the same time. More serious than the pile-up of dishes was the fact that workers were delayed in returning to their work places.

Now there's an end to congestion. Workers can place their dishes anywhere along the conveyor belt, get back to work on the dot.

YOU BE THE ARBITRATOR

THE CASE OF

The Payless Holiday

Out of the experience of the American Arbitration Association

Frank R., a machinist in a company manufacturing laundry equipment, asked for a two-week leave of absence to take care of some personal business. The leave, which included Memorial Day, was granted in accordance with a provision of the contract that read: "All leaves of absence shall be without pay."

On returning to work, Frank learned he wasn't going to be paid for May 30. "Why not?" he demanded. "I worked my last scheduled day before and after the holiday. That's all the agreement requires for eligibility."

"Take another look at that leave-of-absence provision," suggested the plant manager. "It says leaves of absence are unpaid. That means you don't get paid for holidays that occur during such absences. If you wanted to get paid for the holiday you should have arranged for a leave during a time when there was no holiday."

The union filed a grievance. The basic question seemed to be which provision of the contract should apply—the leave of absence clause or the holiday pay clause. Suppose you were the arbitrator. How would you rule?

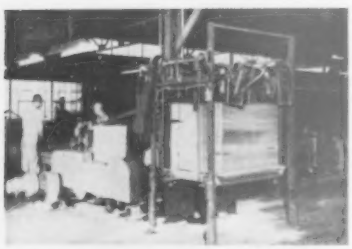
For the actual decision turn to page 170

Handling Odd Shapes in a Small Plant

Here's a system for handling odd-shaped items especially designed for the small plant. At Crandall-Hick Company, Boston, it has eliminated the need for hiring extra help or taking men from other jobs when motors had to be lifted.

The system consists of a tubular track, shields for suspending the track from the concrete ceiling, and a 250-lb.-capacity electric hoist equipped with tandem trolley and 15-ft. power cord. A nylon sling is used to hold the motor in transit.

System was installed by Robert Abel & Company, Brookline, Mass.



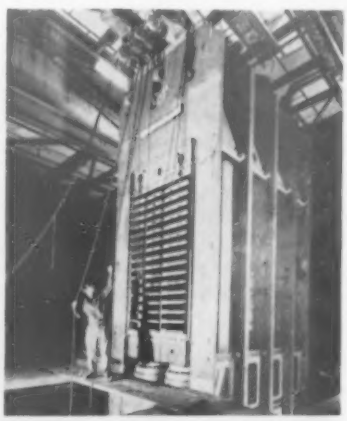
Fast Wrapper Speeds Bundling

Wrapping operations at Johns-Manville's Waukegan, Ill., plant have been speeded 40% with the installation of a synchronized system. This includes a shingle-wrapping machine (Reichel & Drews, Inc., Chicago) and an automatic feeder (Dexter Folder Company, Pearl River, N.Y.)

The company formerly used corrugated paper tied with wire. But part of one side of the bundle and the ends were exposed to soil and water. Also, the wire occasionally caused damage to the product.

Now bundles enter the wrapping machine from the previous operation and trigger two limit switches as they advance. One switch pushes a wrapping sheet from the feeder discharge conveyor into the wrapping machine. The other switch activates the feeder to deliver a replacement to the discharge conveyor.

There is no downtime when the feeder is nearly depleted. During reloading, the top few inches of the pile are supported on forks that are inserted into the pile and secured to the frame of the machine. The platform is then lowered, reloaded, and raised again to the old pile, and the forks are removed.



GIANT PRESS HAS 7000-TON GRIP

This mammoth press can handle 5x12-ft. laminated plastic sheets at the Evendale, Ohio, plant of Formica Corporation (subsidiary of American Cyanamid Company). The press has 16 openings and a clamping pressure capacity of 7000 tons for curing the sheets. It was made by Becker & Von Hullen Company, Krefeld, Germany.

Steel Casing Doubles as Template

The top of a two-part steel casing doubles as a template for end-welded studs at Pantex Manufacturing Corporation, Pawtucket, R. I. This has cut 40% off production cost for this operation.

Studs (Nelson Stud Welding Division, Gregory Industries, Inc., Lorain, Ohio) are used to join two shells in a subassembly. The ½-in. studs are welded to the inner casing through holes in the outer shell—which is positioned just as it will finally be secured. The holes are then sealed, and the studs are permanently joined to the outer shell by puddle welding.

This method is much faster than hand welding, which requires laying out of stud locations on the inner casing. Also, it eliminates possible distortion of casings.

THE OLD

THE NEW

Puts Everything in its Place

There's no more fumbling through a multitude of drawers and shelves to find that lost piece of equipment at Ehrhardt Tool & Machine Company, St. Louis, Mo. Neatness and order are gained with the use of modular steel storage units (Vidmar, Inc., Williamsport, Pa.).

A single drawer in these cabinets holds up to 400 pounds. The drawers open up all the way without sagging or spilling, thus provide easy access to their contents.

Storage level is a maximum of 59 inches from the ground with the new system. Formerly, storage space sprawled over a wide area, making inventory control difficult. And downtime was caused because operators had to search for tools.

CASE BOOK CAPSULES

Miniaturized tunnel diodes capable of oscillating at frequencies in excess of 4000 megacycles have been developed by General Telephone & Electronics Corp., New York City. This is four times the range of previous diodes.

Extreme steel hardness is obtained with a new furnace-bond aluminizing process developed by Wall Colmonoy Corp., Detroit, for high-temperature applications.

Heat extracted from people, lights, and machines inside the new Allen-Bradley Co. research center (Milwaukee) will warm the cooler side of the building. A new heat pump system (Carrier Corp., Syracuse, N. Y.) will do the job.

Almost 2-billion cups of coffee were served by 131,000 vending machines in plants and offices last year. In 1958 there were only 99,000 machines in use.

Swiss automatic ball-and-tip assembly machine at W. A. Sheaffer Pen Co., Fort Madison, Iowa, performs 36 separate operations at a rate of almost one per second.

An electronic ear that can pick up faint radio signals from millions of miles out in space is being used experimentally by the U. S. Army. The 25-lb. amplifier was built by Hughes Aircraft Co., Culver City, Calif.

Sophisticated crane, 20-ton capacity, which will operate in 4 feet of sea water, is under test by the Army at Fort Belvoir, Va.

A thermoelectric generator that will produce 5 watts of power steadily for one year on 50 gallons of propane gas is now being marketed by General Instrument Corp., New York. It weighs 10 pounds and is one foot high.

Seamless tantalum tubing in lengths to 60 feet has been produced by Calumet & Hecla, Inc., Allen Park, Mich. Previously, only shorter lengths were available.

Bright Buckets Bury Butts

There's no mistaking cigarette disposal pails at Republic Aviation Corporation's Farmingdale, N. Y., plant. Placed on the edges of no-smoking areas, the pails are painted bright red and white.

The company first tried office-type urns, but they were too expensive ($14 apiece) and did not hold up under rough shop wear. It next tried to convert regular 5-gal. pails to do the job. But the cost and time involved in cleaning and repainting made these impractical.

The pails now in use (Container Division of Jones & Laughlin Steel Corporation, New York) cost less than 90 cents. A wire screen allows butts to pass through, but stops employees from depositing flammables such as paper.

Quenching Drowns Heat Hazard

Quenching combined with welding salvaged a large pump casing that developed a crack at North Omaha Power Station, Omaha, Neb. The job was done in 2½ hours, a fraction of the conventional welding time. And the method kept the heat down, thus prevented possible distortion and further cracking of the pump casing.

Here's the process: The crack was V'd out with a chamfering electrode after a ½-in. hole was drilled at each end of the crack to prevent spreading. Anti-stress grooves were cut in the sides of the V. Then a sealing electrode was used to fill the grooves and holes and to deposit a thin layer over the entire surface of the V. Finally the V was filled by using a new electrode (Eutectic Welding Alloys Corporation, New York), which produced a dense deposit that was quenched without cracking. This eliminated the wait for one pass to cool before the next one could be deposited.

Streamlined Package

Packaging time for ultra-sensitive instruments has been cut about 25 minutes at Donner Scientific Company, Concord, Calif. A streamlined three-piece corrugated shipping container (Tharco Containers, Oakland, Calif.) did the trick.

Formerly, the plant used a 12-part corrugated packaging system. Two cartons were involved—an inner one containing the instrument and an outer one for protection in shipping. Complete packaging of a product with this system took from 25 to 30 minutes. Also, warehousing and inventory control of the 12 package elements took time, required considerable space.

The new container has only three parts—two of them interchangeable. Just one carton is used. Cushion pads consisting of one piece of double-wall corrugated, two pieces polyurethane, and a die-cut laminated glue block are glued together to form a shock-absorbing cradle. This holds the instrument firmly in place and 3 inches away from the sides of the carton.

Time required to erect the package: 3 minutes.

Moving Expenses Are Plant's Headache

Thinking of moving or opening a branch office in Detroit? You'll probably have to pay most of the expenses of any employees you transfer there, according to a survey by the Detroit Association of the National Industrial Council.

All Detroit companies queried report that they pay for moving household and personal goods. And the majority place no limit on payment of storage fees. More than 90% of the companies reimburse travel expenses incurred in moving—including motel and meals for employees and their families. Average rate for car travel is 8 cents a mile.

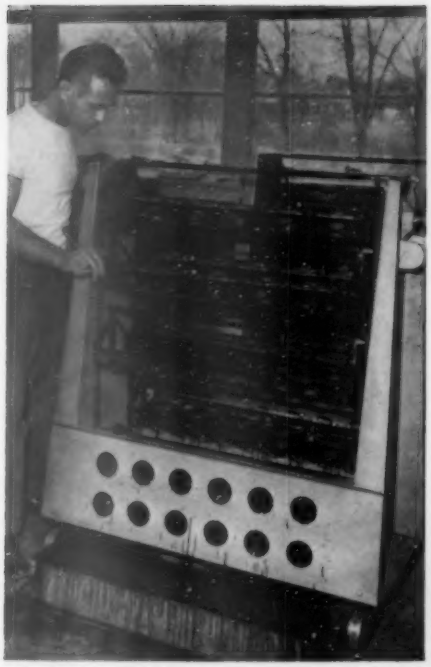
House-hunting trips with the wife are also authorized at company expense in almost all cases surveyed. And eight out of 30 companies allow unlimited house-hunting trips by an employee's wife.

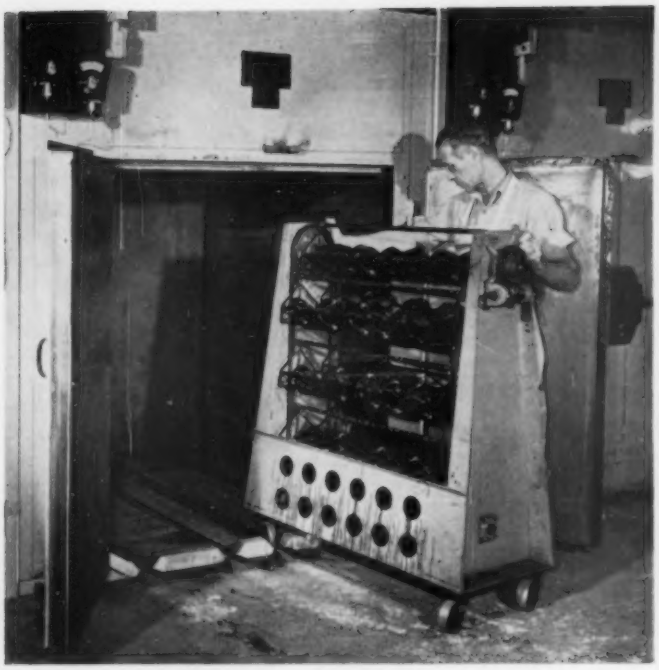
Most of the companies report that they pay for temporary housing for employee and family when permanent housing can't be found or when moving into a new house is delayed. Time limit for payments varies from seven days to three months. In addition, the majority pay part or all of the expenses involved in disposing of an employee's old home. More than 20% of the companies offer to buy the home.

Miscellaneous expenses of moving, such as disconnecting and connecting appliances and installing draperies, are also fair game for the company budget in most cases.

About half the Detroit companies interviewed report they have their policies on reimbursing moving expenses spelled out in writing.

Reprints of the Plant Operating Case Book are available. Price 50¢. For quantity prices, write Reader Service Department, FACTORY, 330 W. 42nd St., New York 36.





1. FERRIS-WHEEL RACK SIMPLIFIES VARNISHING . . . THEN ROLLS TO THE OVEN.

Plant Devices Are on the Beam

The age of automation notwithstanding, no plant can hit top efficiency without a generous dose of employee ingenuity. Plant-made devices — usually inexpensive — have proved that point at General Radio Company, West Concord, Mass. Devices developed by plant workers have considerably boosted the efficiency of the plant's material-handling and production operations.

Here are some examples:

1. Varnishing by cranking. With this plant-made ferris-wheel rack, varnishing needs just a twist of the wrist. The coils are loaded on the grated shelves and a varnish tank is positioned underneath the rack. The operator cranks the device causing the shelves to pass in succession through the varnish tank. Excess varnish drips through the grating back into the tank.

After varnishing there's no need to place the coils on conveyors for baking. The ferris rack on wheels with its load of coils is just rolled to a track leading into the oven where the thermosetting varnish is backed.

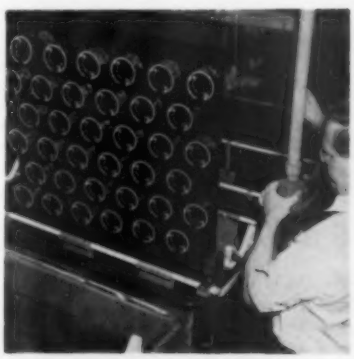
2. Braids cables like shoelaces. By converting a shoelace braiding machine (New England Butt Company, Providence, R. I.) to do cable-braiding operations, the company saved 40% in labor costs. The machine was adapted to handle cables of varying lengths and diverging arms. Cable covers made with it absorb less moisture and look better than those braided by the conventional hand-lacing method.

The noise level of the machines is exceptionally high—reaches close to 100 decibels. But this problem has been solved with the use of ear defenders (Radio Corporation of America, New York).

Cotton, rayon, and nylon thread were all tested for use as cable coverings by the company when the machine was adapted. Nylon was chosen because it wraps tightly and uniformly around any cable diameter. Also, this material possesses a non-hygroscopic quality, which prevents moisture being trapped within the cable.

3. Pushbutton controls plating. Wire-coil plating operations are fast with this plant-made fixture. It holds six staggered rows of six coils each, through the entire plating operation. Operator controls overhead crane by pushbutton.

2. SHOELACE CABLE BRAIDING.



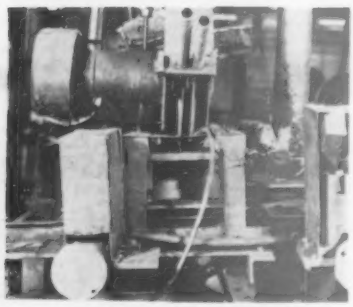
3. PUSHBUTTON PLATING.

Cleans by Suction

Scrap paper and board are removed immediately and automatically at the Chicago plant of Owens-Illinois Paper Products Division (Owens-Illinois Glass Company). And no labor is required.

Pick-up stations (arrow) at various spots in the production area remove the trim and waste strips by suction and blow them through a system of air-conveying ducts to a separator on the roof. The air used to move the scrap is exhausted in the separator. Controlled by electric-eye devices, scrap goes to the baler underneath. A hogger in the baling room reduces the pieces of large board into small chunks. And the baler compresses the board into bales 6 feet long (36 cubic feet overall) to be shipped to paper mills for processing.

The system was installed by East Chicago Machine Tool Corporation, East Chicago, Ind.

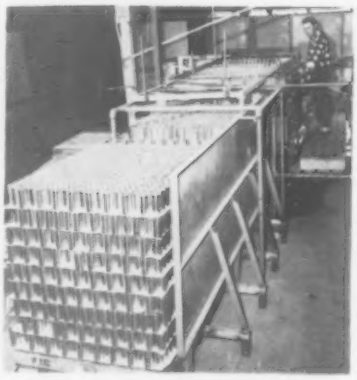


Removing Burrs Fast

An automatic brushing operation that removes slight burrs and sharp edges from parts while they're on the conveyor line is boosting quality and reducing labor costs at Borg & Beck Division of Borg-Warner Corporation.

The company installed a motor-driven shaft with powered brushes over the center of a roller conveyor. Raising and lowering of the shaft is controlled by an air cylinder. The piece is positioned by guide strips on the conveyor. On reaching the shaft, the part automatically activates the air cylinder, which raises it into the brushes. A time relay retracts the air cylinder and the piece drops back into the conveyor for the next operation.

Source: M. D. Gabbert, Master Mechanic, Borg & Beck Division, Borg-Warner Corporation, Chicago.



One-Time Handling

There are no wasted motions in moving tin cans from receiving dock to processing conveyor at S & W Fine Foods, Inc., Redwood City, Calif. Palletization is the trick and one man can do the job.

Previously, the cans arrived at the dock in bags. It took two men to unload them from the boxcars, bail them out with wooden forks, then place them on pallets.

Now a roller conveyor extends all the way from the dock to the processing conveyor. Cans are received already palletized. The pallet load is swiftly guided along the rollers to the depalletizer. There a mechanical arm separates the pallets and sweeps the rows of tins onto the second conveyor.

Some 500 cans per minute can be handled. This compares to 325 under the old system. Use of pallets also eliminates some storage problems and the need to burn or otherwise dispose of papers.

YOU BE THE ARBITRATOR

Continued from page 166

The award—The arbitrator said that when two contract provisions seem to be in conflict, the one with a closer bearing on the situation is applied. For that reason, he upheld the union's grievance. The situation might be different, he said, if the leave of absence were for an extended time.

Caution: The award in this case is not an indication of how other arbitrators might rule in other apparently similar cases. Arbitrators do not follow precedents. Each case is decided on the basis of the particular history, contract, testimony, and other facts involved.

Fuel Cells Could Replace Batteries

Long-life fuel cells to replace industrial truck batteries are expected to be on the market in two or three years. Twelve leading material-handling companies have signed agreements to work closely with Exide Industrial Division (Electric Storage Battery Company, Philadelphia) on a promising new zinc and oxygen rechargeable fuel cell.

Trucks using the cell will be able to run from 16 to 24 hours between charging cycles or replacement of zinc electrodes. The cell requires oxygen at only 9 psi.

Efficiency will be almost double that of lead-acid batteries, more than double that of gas-engine units. Life expectancy will be considerably more than that of present units. Weight, volume, and cost are expected to be competitive with present units.

Contributions from readers reporting experiences will be welcomed. No need for fancy writing; just a clear, concise statement of facts. If you have photos or drawings, be sure to include. We'll edit for the Case Book. Contributions accepted will be paid for at time of publication. Address: Case Book Editor, FACTORY, 330 West 42nd St., New York 36.

The alternate to this is . . . DOWNTIME!

An ounce of prevention . . . can eliminate *downtime* in your plant. With today's highly mechanized manufacturing and distribution methods . . . *downtime* of materials handling equipment can mean the difference between a profit or a loss.

A Clark Dealer *Continuous* Maintenance Program, available from 113 Clark dealers across the continent, offers you the most effective, and economical method of reducing costly *downtime*. Here's why!

In brief, a Clark Dealer Continuous Maintenance Program offers you:

1) . . . regular maintenance on your industrial trucks on a *programmed* basis. Scheduling is conveniently set up for your particular operation. If you like, service to your equipment can be done at night or at any other time when your equipment is not in use. The additional cost for this off-shift service is a small percentage of the cost of *downtime*.

2) Clark dealers, with the aid of a national service personnel training program, assure you that the best trained mechanics in the industry will service your equipment. These highly trained specialists perform a minimum of 22 separate inspections on every truck serviced. They not only perform the normal jobs of greasing and oil changes, but also make all necessary adjustments to your equipment. Most important, they report the condition of your machines, anticipating failure before it happens. As a result . . . *downtime* is drastically reduced.

3) A Clark Dealer Continuous Maintenance Program gets you out of the repair and maintenance business. It eliminates the need for special tools, parts stock and use of valuable plant space for servicing facilities.

4) A Clark Dealer Continuous Maintenance Program is economical. It actually costs less than similar service on your own automobile. This is an inadequate comparison, however, when you consider the small cost of preventive type maintenance to the cost of *downtime*.

For detailed information on a Clark C.M. program call your local Clark dealer (he's listed in the Yellow pages) or write: C.M. Service, Clark Equipment Company, Battle Creek, Michigan. No obligation, of course.

CLARK® EQUIPMENT

Printed in U. S. A.

For full details, circle 77 on reader service card

Found—in the finest squares and circles—**steel pipe,** the versatile tubular conductor

A new dimension in consumer services is exemplified by Fashion Square—a "first of its kind" personal service center in Santa Ana, California, conceived and built by nationally famous Bullock's, Inc.

In keeping with the Square's functionalism, *steel pipe* was logically first choice for plumbing, heating, vent lines and fire protection. Because *steel pipe* was readily available —black for fire sprinklers, galvanized for water, vent and drainage lines—its use resulted in low-cost, durable service piping that was quickly installed.

Steel pipe is always first choice when economy *plus* strength *plus* ease of working *plus* choice of finishes *plus* ready availability are required. Whatever the application —water, oil or gas transmission; fire protection, heating, cooling and plumbing; vent and drainage lines; refrigeration, ice making, radiant heating or snow melting; electrical or communications conduit—*steel pipe* serves best.

COMMITTEE ON
STEEL PIPE RESEARCH
150 East Forty-Second Street, New York 17, N.Y.

STEEL PIPE IS FIRST CHOICE

- Low cost with durability
- Strength unexcelled for safety
- Formable—bends readily
- Weldable—easily, strongly
- Threads smoothly, cleanly
- Sound joints, welded or coupled
- Grades, finishes for all purposes
- Available everywhere from stock

INSIST ON PIPE MADE IN U.S.A.

Yours for the asking . . .

Write for your copy of the 48-page booklet "Radiant Panel Heating with Steel Pipe." It details the design, installation and operation of radiant heating systems.

HOW MUCH DOES IT **REALLY** COST YOU TO REPLACE A BURNED OUT LAMP?

The cost of the lamp, of course. Plus the cost of the maintenance man's labor and the valuable minutes your work flow is disrupted.

For example: A man replaces a burnout on a one-at-a-time basis in about 20 minutes. If he makes $1.50 an hour, his labor is 50¢. If he interrupts somebody else's work for just five minutes, and your company estimates machine time at $10.00 an hour (it's probably more), there goes another 83¢. This is probably more than you paid for the lamp itself!

G-E Plan For Group Relamping Can Save 26 Hours Labor For Every 100 Lamps! It's based on the more uniform life cycle of General Electric Lamps—and is a time-saving, work-saving, lamp-saving, no-bookkeeping program that can be adopted by any company *even if you've just installed another brand of lamps!* If you're in the dark about this outstanding plan, don't delay another costly day. Send for the whole exciting story by mailing the coupon today!

Progress Is Our Most Important Product

GENERAL ELECTRIC

MAIL THIS COUPON TODAY!

General Electric Co., Large Lamp Dept. C-023
Nela Park, Cleveland 12, Ohio

I want to cut my lighting maintenance costs to the bone! Send me more information on General Electric's Group Relamping Plan right away!

NAME_____

COMPANY_____

ADDRESS_____

CITY_____ ZONE____ STATE_____

MOS

NEW SYSTEMS TECHNIQUE PROVIDES CURRENT DATA TO CONTROL YOUR MANUFACTURING CYCLE... MAKES YOUR OPERATION MORE EFFICIENT, WITH FASTER RESPONSE TO CHANGES

IBM MANAGEMENT OPERATING SYSTEM

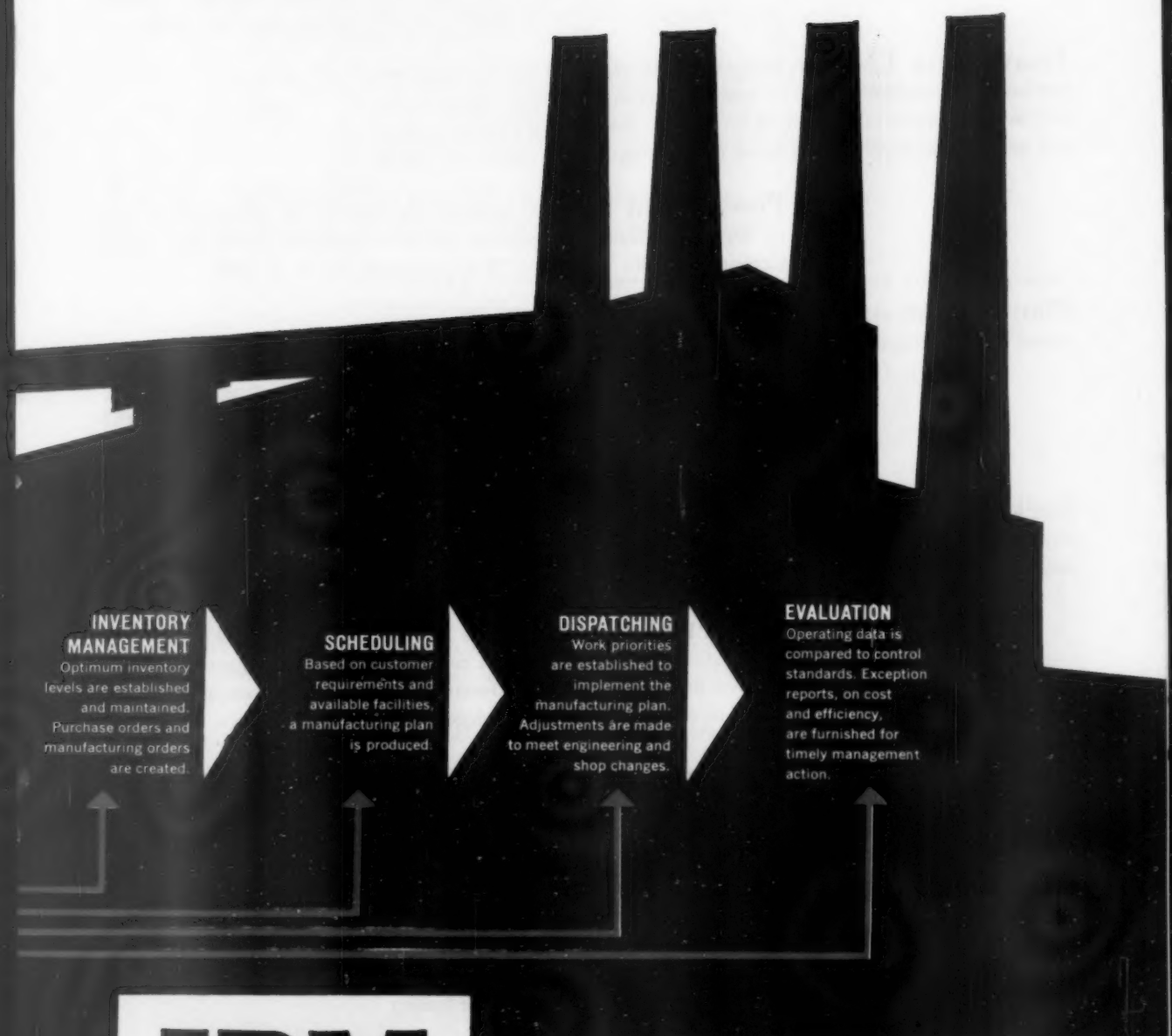
To coordinate planning and control functions continuously throughout the manufacturing cycle IBM has developed a unique Management Operating System. This system makes use of existing IBM data processing equipment, proved in thousands of industrial installations.

WHAT IS THE IBM MANAGEMENT OPERATING SYSTEM?
MOS is a data processing technique that provides the information needed to control your manufacturing cycle. It is designed to handle automatically the decision data required to carry out related functions, from planning and operations control to evaluation. It provides accurate data on a continuing basis . . . in time for effective management decisions.

WHO CAN USE MOS?
The IBM Management Operating System is a flexible technique that can be applied to most types of industrial operations. Every manufacturing operation is unique, however, and IBM manufacturing representatives have been trained to work with you to adapt the basic concepts to your needs. This is an important aspect of IBM Balanced Data Processing—compatible equipment backed by complete services. It gives you comprehensive support in applying the system to your company's operation.

For full information about the IBM Management Operating System, contact your local IBM office.

HOW IBM MANAGEMENT OPERATING SYSTEM PROVIDES DATA TO CONTROL THE MANUFACTURING CYCLE:
FORECASTING
Sales data is reviewed to produce a finished product plan.
MATERIALS PLANNING
Materials requirements are determined.
MOS


INVENTORY MANAGEMENT
Optimum inventory levels are established and maintained. Purchase orders and manufacturing orders are created.
SCHEDULING
Based on customer requirements and available facilities, a manufacturing plan is produced.
DISPATCHING
Work priorities are established to implement the manufacturing plan. Adjustments are made to meet engineering and shop changes.
EVALUATION
Operating data is compared to control standards. Exception reports, on cost and efficiency, are furnished for timely management action.

IBM®

BALANCED DATA PROCESSING

For more facts Circle 470 on Reader Service Card

FACTORY

IDEAS OF THE MONTH

By LEWIS K. URQUHART, Consulting Editor

(For more information, circle item numbers on Reader Service Card next to back cover)

Mouth-to-mouth rescue breathing, hailed as best method of artificial respiration, is now possible without personal contact with victim, if you're using new oral resuscitator *(Venti-Breather).* No training necessary. **(236)**

Heavy-duty 12-hour stopwatch *(Heuer Timer)* is precision instrument designed for panelboard mounting and easy visibility. Alternate dial face has extra peripheral divisions in hundredths. Another dial reads in production units per hour (50 to 200) based on time required for single unit. **(237)**

Power Arm is new handling unit *(Skagit)* you can mount on 1-ton (or larger) truck frame. Hydraulically operated, power furnished by truck engine. Capacity, 5500 lb. Lift, up to 20 ft. Extension, to 13 ft. **(238)**

Plant Maintenance Cleaning is newest compilation of data *(Oakite)* on key cleaning jobs that classify as maintenance. Free, of course. **(239)**

Shock-absorber door, in which flexible urethane foam *(Nopco)* is used as buffer material between door surface and striker panel, will take all the pounding it's so sure to get from in-plant trucks. **(240)**

Background music package *(Stromberg-Carlson)* includes long-play tape decks, amplifiers, speakers, music library. Components can be incorporated into any sound system. Library gets replacements each month. **(241)**

Booklet of the Month is 16-page bulletin *(General Electric)* titled "Automation and You." It assesses current state of the art, summarizes benefits, gives information on six key functions: process control, computing, instrumentation, numerical control of machines, sensing, communications. **(242)**

When assembling light-gage metal parts, think of Tapit *(Parker-Kalon),* new screw that drills own hole, forms own thread, has integral washer with serrated face that acts as brake to minimize stripping and spinning. **(243)**

Crab grass in lawn? Yellow Devil *(Engine Parts)* is killer-diller (contains disodium methyl arsonate) for post-emergence application. **(244)**

Newest in cushion packaging is shock-absorbing pad *(Hardigg)* of foam laminated to heavy corrugated so it can't settle. Pads create floating inner package held firmly on all six sides of shipper. **(245)**

Make or buy? Whether 'twere better to own your own screw machine department or to purchase screw machine parts from independent producers? New report *(NSMPA)* clears up all your questions. **(246)**

You'll want newest kit *(Towmotor)* aimed at making lift trucking safer, more efficient. Contains 30-point safety and 32-point maintenance checklists, four cartoons for bulletin boards, four large route posters with caution messages *re* narrow aisles, blind corners, dangerous crossings, low headroom. **(247)**

Well-dressed plant firefighters are wearing breathing equipment *(Rockwood)* with two oxygen cylinders—one a working cylinder, the other a 5-min. escape cylinder to use after the first one is empty. **(248)**

Will air conditioning pay off for me? Booklet *(Carrier)* presents four key check figures with which you can qualify your operation. **(249)**

Safety hook *(Shepard Niles)* fits any crane or hoist. One-hand operation leaves other hand free to guide load or signal "good-bye." Catch swings out of way for full-throat opening, can't be bumped out of locked position. **(250)**

Paint touch-up is quick and easy with Wren-Pak *(Binks)* which teams air brush with canned power supply for 30 minutes of intermittent spraying. No masking needed for most operations. **(251)**

Holes drilled with air-powered mechanical-feed drills *(Ingersoll-Rand)* are so true and clean you seldom have to ream. No plunging or break-through. Constant feed decreases amount of burr on hole rim. Holes can be precisely located even when drilling at difficult angles. **(252)**

All about silicones: processing information, engineering data, typical applications. New brochure *(Dow-Corning)* is yours for the asking. **(253)**

Mystic Gratelite *(Guth)* changes from open louver diffuser to solid-looking luminous panel, depending on your point of view. And gives you the high-intensity, softly diffused lighting you're looking for. **(254)**

If you have to lift, transfer, pull, turn over, rotate, or position metal sheets, plates, blocks, slabs, weldments, castings, tubing, structural shapes, etc., Gonser lifting tools *(James Campbell Smith)* are quickly clamped on by hand, won't lose their holt till manually loosened. **(255)**

New fire extinguisher *(Alim)* is UL-approved for all classes of fires. No danger of squirting wrong stuff on wrong spot. **(256)**

For intermittent drum wrestling there's a new handling unit *(Specialty Machinery)* that any standard lift truck with 24-in. clearance between forks can pick up or put down as easily as any ordinary pallet. **(257)**

Turn the page

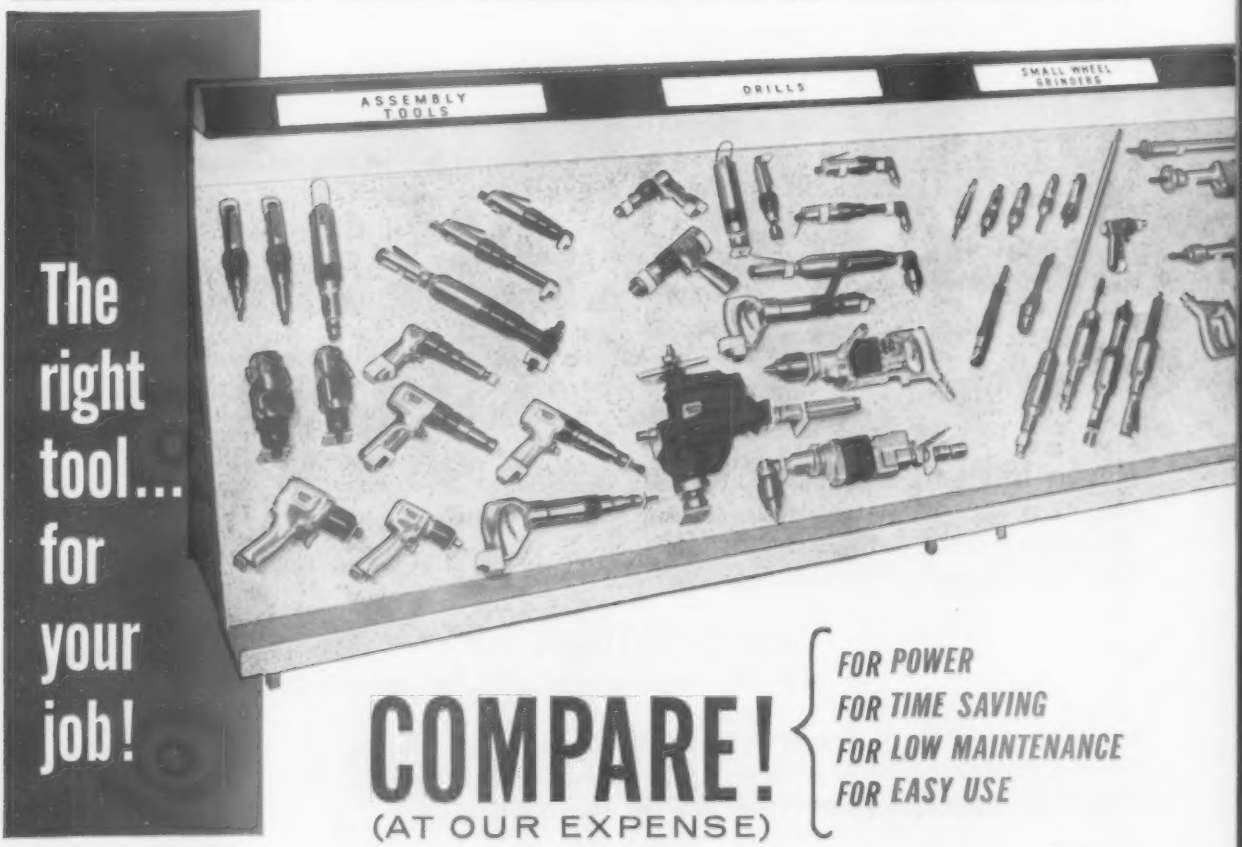
Voice Director is a new pocket radio *(General Electric)* that weighs only 12 oz. with battery, operates on 35% less power than other similar equipment. Tiny plastic horn clips to lapel, can be used when privacy isn't necessary or when radio won't disturb others. For strict privacy an earpiece may be used. **(258)**

Self-contained power supply means new Magna Lift *(Hanchett)* can be used indoors or out, for scores of lifting jobs. Capacity, 4000 lb. **(259)**

Magne-Tab cards *(Business Efficiency Aids)* are real timesavers. Built in magnetic action causes 20 or more to fan out in file trays at any point of reference—with enough space between cards for easy removal. **(260)**

Tote box of linear polyethylene *(Patti Plastics)* is 26x25x12 in., weighs less than 10 lb., holds more than 300 lb., stacks at 11 in. Perfect for degreasing, washing. Withstands temperatures below zero, up to 250 F. **(261)**

Decorates—separates—brightens is title of booklet on patterned glass *(American-St. Gobain)* which comes in wide range of linear, checkered, and over-all designs. Worth a second look for anyone thinking of dividing large areas into small, comfortable, private offices. **(262)**



Slide calculators *(Adamas)* are yours for the circling. Carb-A-Guide supplies machinability rating, grade of carbide to use, surface speed, etc. Computer Slide is speedy multi-purpose calculator incorporating data on hardness conversion, speed conversion, milling feed rates, horsepower. **(263)**

Flameproof gloves *(Air Reduction)* reflects 90% of all radiant heat. Leather palms, aluminized backs and thumbs make them naturals for welding and cutting operations, etc. Three styles: 5-finger carpincho leather glove, 1-finger mitten, and 5-finger glove of green heat-resistant leather. **(264)**

Something new in gages: quick-change Height-Master *(U. S. Chemical Milling)*. Accurate to 0.0001 in. Heights, 17 to 108 in. **(265)**

Park-King is new siliconized coating *(Pace Products)* that waterproofs asphalt driveways, ramps, parking areas. Satin-black finish. **(266)**

As we began—with mouth-to-mouth rescue breathing—so we end. With quick note about Respertrain, an extremely lifelike mannikin *(Alderson)* for instruction and practice. And about Synjuries and Syncas, with which you'll always have synthetic casualties available for first-aid training. **(267)**

Find out how you can cut your costs with ROTOR TOOLS. Ask for free demonstration. Write for copy of Bulletin 53C. The Rotor Tool Company, Cleveland 32, Ohio.

ROTOR TOOLS

The Rotor Tool Company - Cleveland, Ohio
SUBSIDIARY OF THE COOPER-BESSEMER CORPORATION

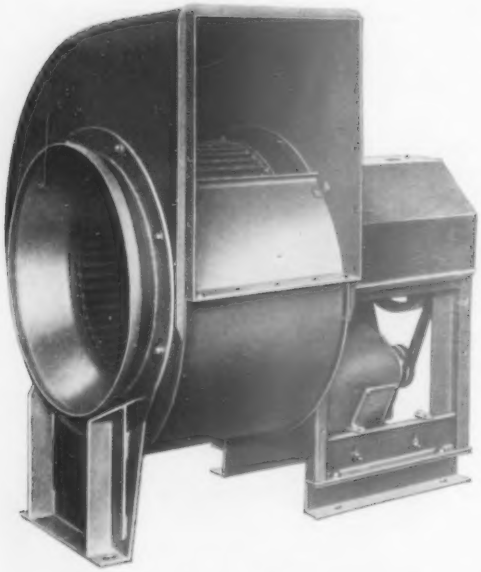
For more facts Circle 471 on Reader Service Card

CLARAGE

New line of

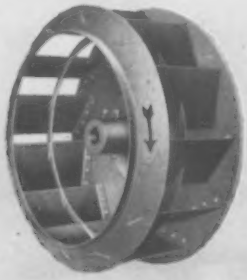
V-belt driven

Ready Units



LS Ready Units have Low Speed, forward curved blade wheels. These are of the long-recognized Clarage Type HV multiblade design.

or



MS Ready Units have Medium Speed, backward inclined blade wheels with non-overloading horsepower characteristic. These are of the highly regarded Clarage Type NH, Class I design.

Exceptionally sturdy, quiet, ready-to-run fan sets

- for volumes up to 25,000 CFM
- for static pressures thru $2\frac{1}{2}$″
- for clean air up to 300° F.

Distinguishing points — over 15 of them — make these new Clarage units outstanding.
To mention a few: Better motor ventilation . . . entire drive within frame of unit . . . complete accessibility to motor, drive, and bearings. Learn more about the numerous specific advantages that mean greater value to you from Clarage. Request Catalog 517 . . . 36 pages of complete information, selector charts, capacity tables, dimensions.

Clarage Ready Units are ideally suited for supply or exhaust jobs — indoors or outdoors — for buildings of all types, all sizes.

Write for your Copy

Dependable equipment for making air your servant

CLARAGE FAN COMPANY

Kalamazoo, Michigan

SALES ENGINEERING OFFICES IN ALL PRINCIPAL CITIES • IN CANADA: Canada Fans, Ltd., 4285 Richelieu St., Montreal

For more facts Circle 472 on Reader Service Card

FACTORY

ONLY VISIBLE BLADES GIVE YOU SAFETY YOU CAN SEE!

• The men who pull the switches will tell you what can happen when a switch, *believed* to be open —*isn't*. A lot of things can happen—and every one of them is bad. Personnel safety is in jeopardy. Motors can single-phase. Machinery and work can be damaged. Down-time can skyrocket.

Doesn't it make sense to insist on **V**isible **B**lade construction which gives you a road block against any of those possibilities? Doesn't it make equally good sense to insist on the safety switch which gives you that construction—plus a lot of other performance advantages? Evidently it does, because *Square D switches have never been out of first place in more than 50 years!*

They cost no more... why settle for less?

MAIL the coupon for latest Safety Switch Bulletin

Square D Company, Dept. SA-104
1601 Mercer Road, Lexington, Kentucky

Please send me your latest SAFETY SWITCH BULLETIN

NAME_____

COMPANY_____

ADDRESS_____

CITY_____ ZONE____ STATE_____

SQUARE D COMPANY

wherever electricity is distributed and controlled

By PAUL A. KING, Member, New York Bar

Can Lockouts Be Lawful? Yes—Sometimes.

Employers have a hard time recognizing that where employees are permitted to strike, companies aren't always permitted the counterpart of a strike—a lockout.

Here are three cases that illustrate an unlawful lockout, a lawful lockout that ended up as an equally lawful partial lockout, and a lockout that wasn't a lockout at all despite the union's stretch of its imagination.

An unlawful lockout during contract negotiations cost the Hercules Powder Company (Wilmington, Del.) back pay for all locked-out employees. Its only consolation was a dissent by Chairman Leedom and Member Rodgers of the National Labor Relations Board.

The general rule is that a lockout is taboo. When it is condoned by the Board it is on the basis of defense—not as an economic or negotiating weapon. In the Hercules case the Board said: "If respondent resorted to the lockout merely to avoid the possibility of a strike and its attendant disruption, its action cannot be justified under the law. Such anticipatory conduct is not sanctioned . . . and layoffs so motivated violate the Act (the NLRA)." However, a lockout will be sanctioned in the face of a strike if it is necessary to prevent damage to the employer's physical plant.

Hercules thought it was threatened with a quickie strike. It shut down operations so it could leisurely and carefully process explosives and clean out its plant. The NLRB majority found no evidence of a threat of a quickie strike. It pointed out that Hercules had been given verbal assurances by the union of its willingness to give a 72-hour notice. Past experience with this union confirmed responsibility on this point.

In case number two, the lockout was held to be lawful. The employers involved were members of a bargaining association. The lockout was a defense against whipsaw strikes—another basis on which the NLRB sometimes sanctions lockouts. It was called when the union had decided to pull a strike on one member of the association. However, when the locked-out union members began to apply for unemployment insurance, they were offered enough work to give them $16 a week. Under Montana law, a claimant is disqualified for any week in which he has received employment exceeding an 8-hour day or $15.

The NLRB decided the full lockout was lawful—but this partial lockout was not. It was discriminatory and tended to discourage union support. A U.S. Court of Appeals overruled the Board and reminded it of the Prudential decision (see next item), which ruled that the Board couldn't dictate the economic weapons used by unions (here, harassing tactics instead of a full strike).

In the present case the court ruled that the Board couldn't dictate to employers what economic weapons they could use. It reminded the Board that "until some millenium arrives when contests between the employer and his employees can be settled by some process of adjudication, it must be recognized that collective bargaining is a brute contest of economic power somewhat masked by polite manners and voluminous statistics."

Case number three occurred in Pennsylvania and in Perry Mason style could be called "The Case of the Stretched Imagination." A union claimed it was locked out. The union had asked management for additional help so as to cut out some of the overtime. The company felt it was unnecessary. The union members walked out when it appeared that overtime would be required—and stayed out for several weeks.

The union argued before the Pennsylvania court that employees were locked out because the company was withholding work by giving them too much work. They reasoned that if they refused the overtime, they would have been denied any work. Under Pennsylvania Unemployment Compensation law, an employee is not eligible for idle pay if his unemployment is caused by a stoppage of work which exists because of a labor dispute other than a lockout.

The court stated that the essence of a lockout is withholding work. Here the employer didn't withhold work. He was offering them too much work. This was not a lockout.

Secondary Boycotts

Can your striking employees pass out leaflets in front of your distributor establishments?

Your product is sold to retailers. The union strikes against you because you won't agree to their contract demands. They picket you. So far everything is according to Hoyle. But they go a step farther. They pass out handbills in front of your retailers. The public is asked not to buy goods from the store delivered behind the picket line. The leaflets make it very clear that the strike is against you, but the retailers complain. Do you tell them that the union can be compelled to stop handing out leaflets? Is it a secondary boycott and therefore unlawful under the new law?

It is, said the NLRB general counsel in a case involving substantially these facts. But no, said an NLRB trial examiner. He directed the attention of the general counsel to the recently passed boycott provisions that permit publicity truthfully advising the public that the distributed products were made by an employer who has been struck.

Passing out of leaflets is okay, said the trial examiner, provided no person (except those in the employ of

No more drudgery for me in cleaning grease-caked floors

A flip of the switch re-sharpens brushes automatically!

His boss is happy too . . .

and should be. Now an Industrial Dry-Scrubber, Finnell's 84XR at left, does the job in about one-tenth the man-hour time required to hand-scrape the floors! And of course the machine is far more thorough, and spares maintenance men the back-breaking effort of manual methods. Equipped with two powerful scarifying brushes, the *84XR* digs through and quickly loosens even the most stubborn coatings of dirt, oil, grease, and shavings. Universal couplings enable the brushes to clean recessed areas that rigid coupling brushes would pass over and miss.

Reversible motor keeps wires sharp. *A flip of the switch* reverses the rotation of the brushes and re-sharpens them automatically . . . *while working!* Eliminates the need for frequent changing of brushes by hand in order to maintain a sharp cutting edge. Reversal of brush rotation also helps keep the brushes functioning efficiently by ejecting sticky substances that would otherwise clog and slow up the cleaning process. Total brush spread of the *84XR* is 22 inches. Low, compact design permits cleaning right up to and beneath machinery — areas where deposits are heaviest. Interchangeable rings and brushes adapt the machine to wet-scrubbing, polishing, and steel-wooling.

Brushes adjust to floor irregularities

Clean floors allow industrial trucks to move swiftly, surely and, according to actual tests, with *half the pull* it takes to move loads over dirty floors. In addition, clean floors aid safety underfoot and contribute to worker productivity. So it pays to keep floors clean — especially with a labor-saving *84XR!* (The Vacuum Cleaner at extreme left, *Finnell's 10C,* features a 1½ hp, 115v AC-DC By-Pass Motor. Tank capacity: *Wet,* 12 gallons . . . *Dry,* 1¼ bushels.)

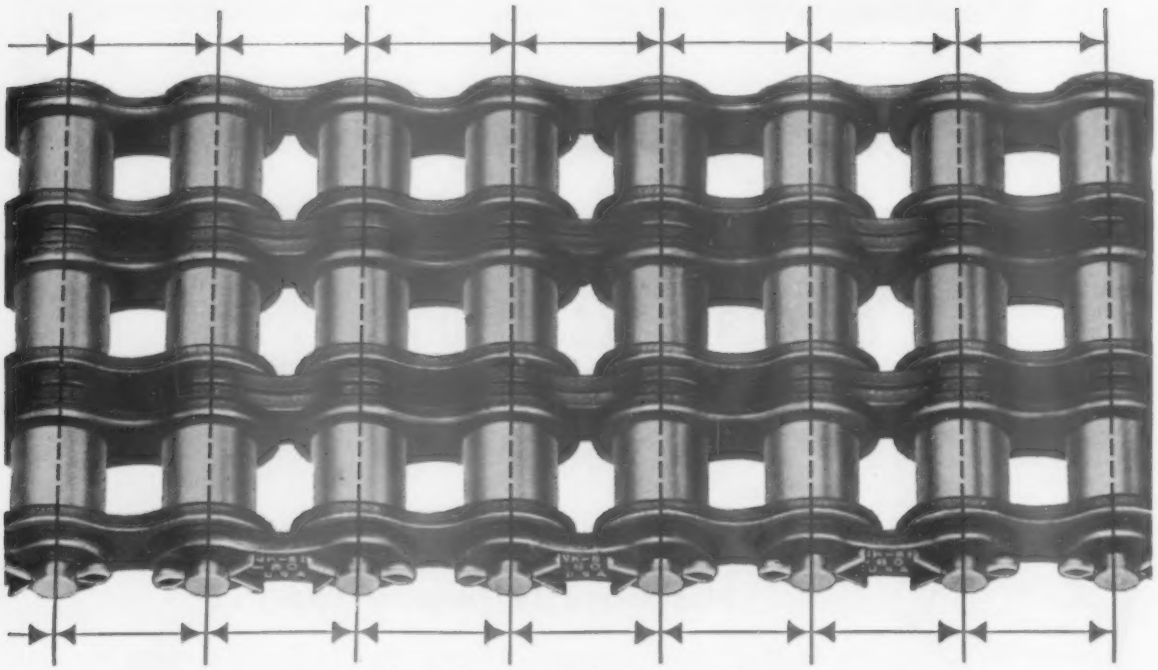
For demonstration, consultation, or literature, phone or write nearest *Finnell Branch* or Finnell System, Inc., 2507 East Street, Elkhart, Indiana. Branch Offices in all principal cities of the United States and Canada.

FINNELL SYSTEM, INC.

Originators of Power Scrubbing and Polishing Machines

Everything FINNELL for Floor Care

BRANCHES IN ALL PRINCIPAL CITIES



Precision controlled link pitch throughout
LINK-BELT roller chain means

equal length... equal strength

How pre-stressing ensures uniform load distribution of multiple-width LINK-BELT roller chain

Pre-stressing is one of the reasons why Link-Belt multiple-width precision steel roller chains easily handle the grueling loads common on today's drives. It seats and cold works the chain joint parts, assuring equal load distribution across the chain, minimum initial elongation, increased fatigue life.

Pre-stressing is just one of many "extras" that contribute to the *greater dynamic strength* of Link-Belt roller chain. Others include: close heat-treat control, lock-type bushings, shot-peened rollers, pitch-hole preparation. For details see Book 2657.

PRE-STRESSING MACHINE provides the pull that "sets" the parts of Link-Belt multiple-width roller chain. Besides assuring uniform load distribution, pre-stressing eliminates application difficulties on fixed center drives because the chain leaves the factory at precise operational length.

LINK-BELT

ROLLER CHAINS AND SPROCKETS

BOOK 2657 has 154 pages of roller chain data. Contact your nearest Link-Belt office or authorized stock-carrying distributor. (See CHAINS in the yellow pages of your phone book.)

15,361

LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants, Warehouses, District Sales Offices and Stock Carrying Distributors in All Principal Cities. Export Office, New York 7; Australia, Marrickville (Sydney); Brazil, Sao Paulo; Canada, Scarboro (Toronto 13); South Africa, Springs. Representatives Throughout the World.

Begins on page 182

the struck company) is thereby refrained from picking up, delivering, or transporting goods or performing services at the place where the products are distributed. Since none of these dire results existed here, there was no violation of law.

In rendering his opinion, however, the trial examiner did acknowledge that an object of passing out the handbills was to get the retailers to stop doing business with the wholesaler. But this, he said, was immaterial in view of the truth-publicity provisions of the new law.

No Contract for Me

These may be your private sentiments, but don't admit them to your employees who are being organized.

You can tell your board of directors or your wife that you have no intention of signing a union contract, but tell it to your employees during an organizing campaign and you violate the Labor-Management Relations Act. Just such a statement alone will do it.

An NLRB trial examiner did his best to support an employer who expressed this view to his employees. But the NLRB upset his finding. The examiner felt that a statement of this kind violates the law only within the context of other threats or violation of the Act. Not so, said the NLRB. "The Board has consistently held that a company's threat not to sign a collective bargaining agreement interferes with, restrains, and coerces employees." It amounts to a threat to employees to refrain from assisting or becoming members of any union. Such a threat goes beyond the mere expression of views, arguments, or opinions protected by the law.

Sweetheart Shops

Home-grown unions friendly to management are out when an honest-to-goodness outside union knocks on the door.

A Jamestown, Pa., employer had been having a pretty good time of it. For three years he pressured individual members of his shop committee

"Call FOSTER for Rail"...Get Relayers PLUS

Installing or expanding in-plant trackage? Foster will deliver Quality Relaying Rail at lower cost . . . "plus" all necessary new track accessories, switch material—even the track tools to do the job. To help select the materials best suited to your job, call the Foster Track Specialist.

You will save on freight from Foster's nationwide warehouses, all of which stock all sections of relaying rail "plus" new rail for crane runways and specialized applications.

Another "plus": Foster's Track Inspection Kit, which illustrates all the elements needed for an efficient industrial siding. It's a real help for proper track maintenance.

Write **L. B. FOSTER CO.** for free Track Kit FA-7 Pittsburgh 30, New York 7, Chicago 4, Houston 2, Los Angeles 5, Atlanta 8, Cleveland 35.

Faster From Foster

Pipe • Rental Steel-Sheet Piling • Pipe Pile • Rail

For more facts Circle 476 on Reader Service Card

This kind of outstanding performance can be yours . . .

• You, too, can have the benefit of *planned mechanized handling*. Confusion and re-handling are virtually eliminated, and in their place is created a smooth, continuous flow of product through processing, warehousing and shipping.

For up-to-the-minute materials handling, we believe you get the best there is when you buy equipment that is *Mathews Engineered—Mathews Planned—Mathews Built* for you.

GENERAL OFFICES ..... MATHEWS CONVEYER COMPANY
Ellwood City, Pennsylvania
WESTERN DIVISION ..... MATHEWS CONVEYER COMPANY WEST COAST
San Carlos, California
CANADIAN DIVISION ..... MATHEWS CONVEYER COMPANY, LTD.
Port Hope, Ontario, Canada

Over Fifty Years of Leadership in Mechanized Handling

MATHEWS

For more facts Circle 477 on Reader Service Card

Begins on page 182

and his shop to sign the contract agreed upon during bargaining sessions. The employer even sat in at contract ratification meetings. But one year, the International Association of Machinists caught up with him. Since they wanted in, they saw to it that he was brought up before the NLRB. This was the order the Board handed down:

(1) Cancel sweetheart contract.

(2) Do not recognize the shop committee until such time as it has been certified by the Board.

(3) Stop supporting it.

(4) Stop discouraging membership in the machinists' union.

Employee Councils

They can be helpful in improving employee morale, but if they are not handled right, they may get you into NLRA trouble.

The best time to lick a union is long before the first disgruntled employee begins to say to himself, "What we need around here is a union." Treat them well and the odds are that your employees will shrug off the union organizer. But some employees are asleep at the switch. The union creeps up on them and before they can say NLRB there's an election.

One company we know of won the election—and then began to do the things it should have considered doing long ago. For example, it suggested that its employees form an employee council. And they did.

The company's director of industrial relations explained that its purpose would be to improve relations and communications between management and the hourly paid. In response to a question, the director suggested that when an employee had a grievance, the councilman responsible for that employee's area should assist in adjusting the problem before the foreman. It was by this activity that the council violated the NRLA. It also violated the NRLA when it made recommendations to the company on seniority, job preferences, personnel practices, and so on. The NRLB ruled that because of these activities the council was a labor organization. It ordered the

Just 0.1° F Change Gets Fast Action...

from a Fenwal THERMOSWITCH® Unit

Extreme sensitivity is an outstanding control characteristic of the Fenwal Thermoswitch Unit. Its outer shell is the heat-sensitive element . . . strut-and-shell assembly responds almost instantly to a change in temperature. Contacts are totally enclosed and protected. There's no thermal lag in the unit. *Control is positive and precise.*

Thermoswitch Units are easily adjusted, and cover the range from −100 to +1500°F. They're available as miniature, surface-mounted, or immersion types, with special variations to resist corrosion, extreme vibration, and shock. Current ratings up to 10A-115VAC. *Whichever unit you choose will be rugged and compact — simple, reliable, and inexpensive.*

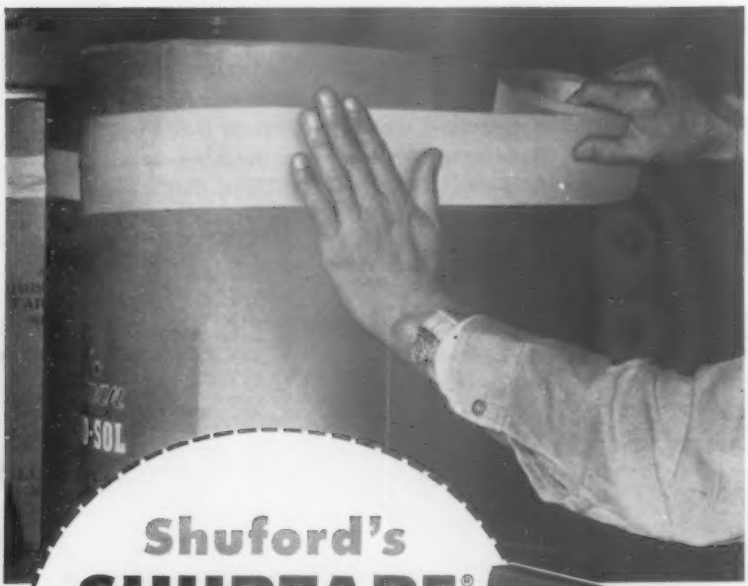
Build better temperature control into your products with Fenwal Thermoswitch Units. For illustrated booklet, write Fenwal Incorporated, 256 Pleasant Street, Ashland, Massachusetts.

Series 17000
THERMOSWITCH Unit

Another example of how **Fenwal** CONTROLS TEMPERATURE . . . PRECISELY

For more facts Circle 478 on Reader Service Card

Thin Gauge
High Adhesion TAPE
for many industrial uses



Shuford's SHURTAPE® FP-20
Flatback Paper Masking Tape

Here's a tape that features instant adhesion, high holding power, yet releases easily from the roll and strips clean hot or cold.

Ideal for masking use, especially for long, straight lines, on wood or metal. Having excellent resistance to abrasion, SHURTAPE FP-20 may be used for holding, banding, bundling, sealing, and many other purposes.

Write for complete information to

CLOTHES LINES • TWINES
PRESSURE-SENSITIVE PAPER TAPES
SASH CORDS • WEATHER STRIPPING
COTTON & RAYON YARNS • EXTRUDED PLASTICS

World's largest manufacturer of cotton cordage

4617

For more facts Circle 479 on Reader Service Card

Begins on page 182

company to cease and desist from dominating, interfering with, or supporting the council. So, after having defeated the union handily and having won an election, the company ended up with a union of sorts—and one it couldn't dominate.

Self-Insurance and Welfare Plans

Some unions go for self-insurance. Some employers don't. What happens when the employer and union trustees of a welfare plan are deadlocked on a decision?

Under the Labor-Management Relations Act of 1947, when the trustees of a union-management welfare fund are deadlocked on a matter, a U. S. District Court is to be called upon to appoint an arbitrator to make the decision. In one case, the union trustees favored self-insurance for some of the benefits furnished by the plan. The employer trustees were opposed. A district court was called upon to appoint an arbitrator, but refused. Said that the trustees didn't have the power to adopt self-insurance. The trust agreement limited the plan to "the purpose of providing and maintaining group life, accidental death and dismemberment insurance, accident and health insurance, or other forms or policies of insurance as may be determined by the trustees to be advisable. Self-insurance was not contemplated.

The best time to eliminate self-insurance if you are opposed to it is when you are negotiating the trust agreement. Put in a limiting clause such as that set out above.

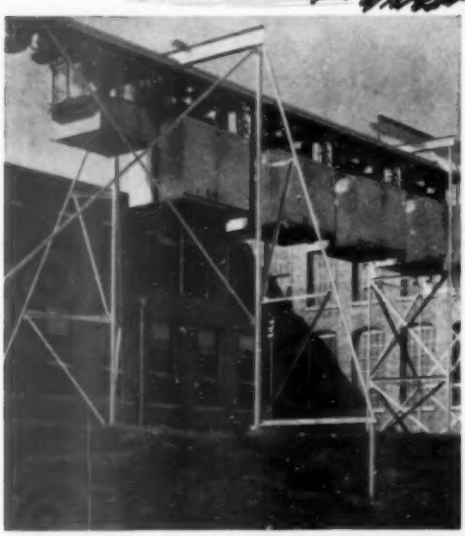
No Sick Pay Here

Absence for medical check-up is not sickness, despite a medico's certification.

When a union contract spells out pay for illness or sickness, it means just that. An employee who takes off a day for a physical examination is not ill or sick, ruled Arbitrator Whitley P. McCoy.

Turn to page 193

ZOOMING
INTO YOUR FUTURE



Public transport borrows ideas from American MonoRail

Someday you may ride to work this way because public transport officials borrow from efficient handling methods developed by American MonoRail engineers.

For over thirty years all kinds of materials have moved on monorail tracks in nearly every industry—and beginning with hand pushed carriers, today's developments include systems that are completely automatic from pick-up to deposit.

Heavy—bulky—hard to handle loads travel quickly, safely and directly to their destination—through the air. Only the research and experience of American MonoRail engineers make this equipment possible. Write for Bulletin C-2.

ENGINEERED MATERIALS HANDLING

AMERICAN MONORAIL

1114 EAST 200th STREET CLEVELAND 17, OHIO

DIVISIONS: Conveyor Division, Tipp City, Ohio – Canadian Monorail Co., Ltd., Galt, Ont.

For more facts circle 480 on Reader Service Card

For more facts circle 481 on Reader Service Card→

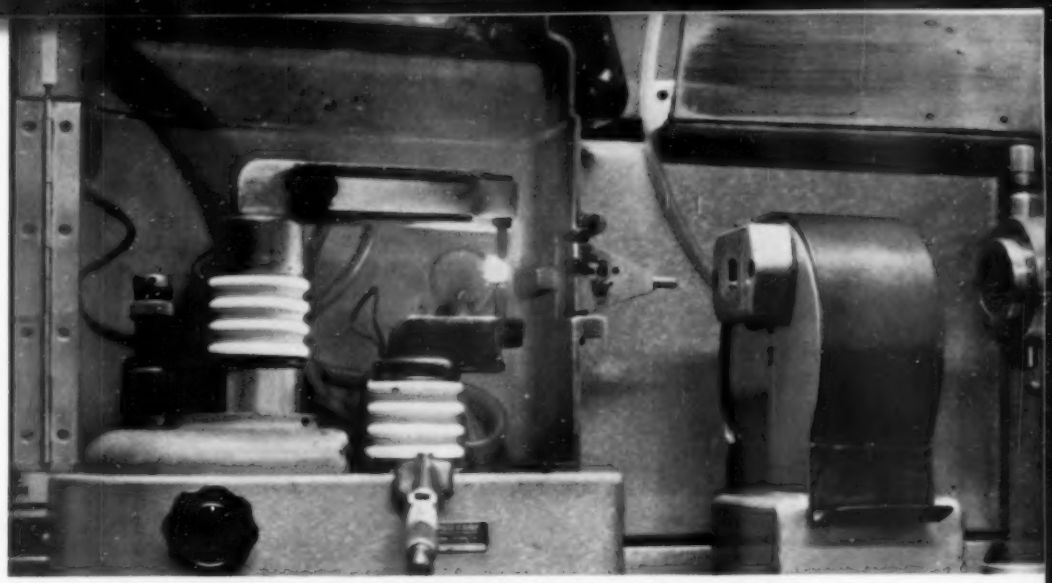
10,125 tests a day assure consistent quality in every Gulf®

GULF MAKES THINGS

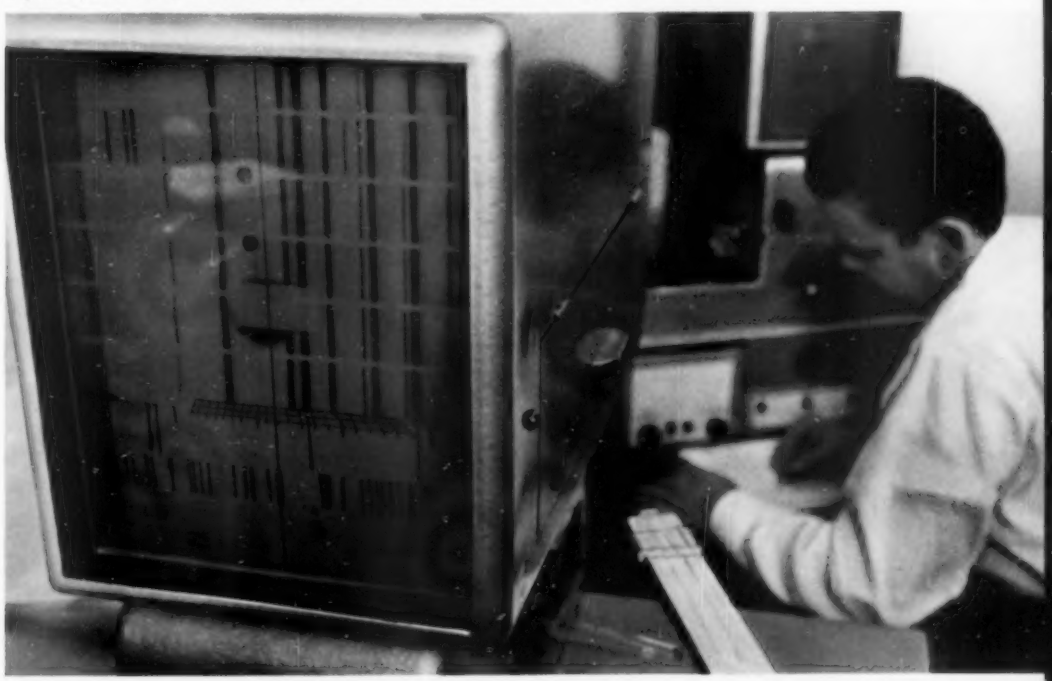
Those bottles you see above contain samples of a variety of Gulf fuels and lubricants, each of which has been subjected to a series of scientific quality control tests at Gulf laboratories. Any one of the tags shown might carry the "pedigree" of a Gulf product your company bought today for use in its plants or motor fleet.

Product purity is policed constantly at Gulf. During the refining process, samples from *every* lot of Gulf gasoline, diesel fuel, lubricating oil and grease are tested and re-tested to make sure that formulations are exact and that impurities are essentially eliminated. For example, Gulfcrest® 44, world's leading turbine oil, is quality-controlled to limit contamination to less than one part per million.

Every Gulf product you purchase bears positive evidence that it is precisely what you ordered. From the lot number on the container, your Gulf office can determine which refinery made the product and the day it was



Emission Spectrograph (above) causes undesirable elements in a petroleum sample to emit their characteristic light spectrum which is photographed on a strip of film. In the Densitometer (below) the spectrum on the film is evaluated to identify the presence of metal contaminants down to less than one part per million.



product you buy . . .

RUN BETTER!

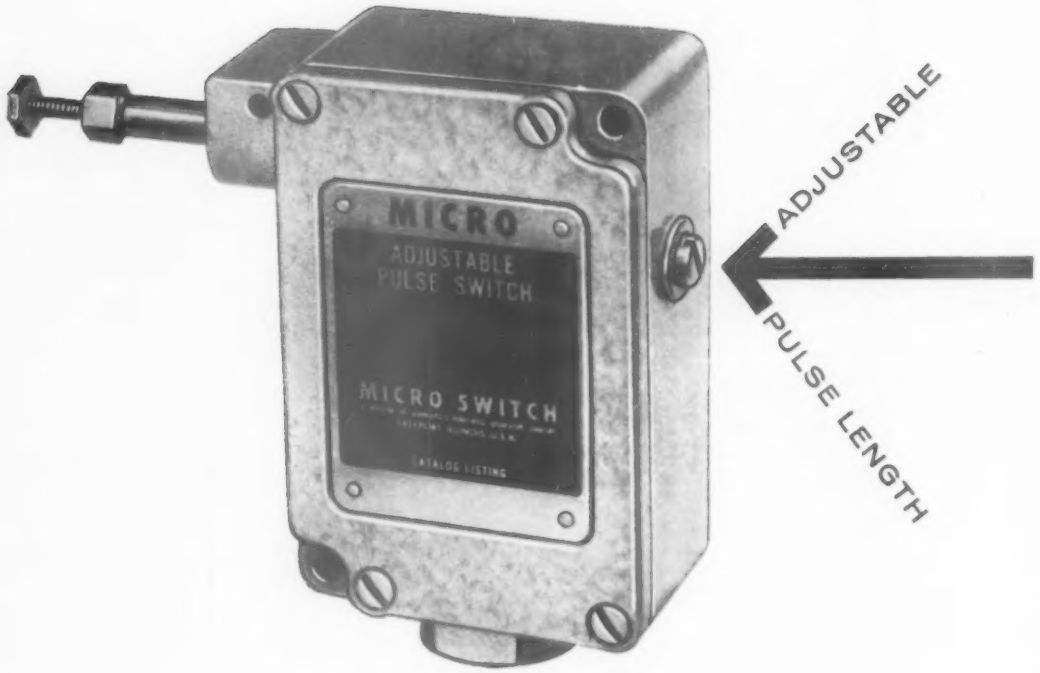
made. Laboratory inspection data is then available for each individual lot.

Gulf testing facilities are also used frequently to help Gulf Sales Engineers solve customer problems involving the use of petroleum products.

Get the complete quality protection that Gulf testing gives you. If your company uses petroleum products in any way, find out how Gulf makes things run better! Just call your nearest Gulf office.

GULF OIL CORPORATION
Department DM, Gulf Building
Pittsburgh 30, Pennsylvania

GULF



NEW Single-Pulse Switch

with adjustable pulse length

EASY TO WIRE. By removing the cover plate, the #8 binder head terminal screws are easily accessible for wiring. The "1PD1" has single-pole double-throw contact arrangement, 10 amps.—125, 250 or 480 vac.

A new limit switch has been introduced by MICRO SWITCH for applications where momentary opening and/or closing of a circuit is necessary. It is designed for control of intermittent-duty devices.

The entire pulse operation—actuation and release—is accomplished by depressing the operating plunger. An exclusive feature of the MICRO SWITCH "1PD1" allows adjustment of the pulse from .030" to .450" by simply turning a screw on the outside of the housing. The "1PD1" is sealed against oil, water and dust. Call your MICRO SWITCH Authorized Distributor or the branch office listed in the Yellow Pages. Ask for Data Sheet 173.

MICRO SWITCH . . . FREEPORT, ILLINOIS
A division of Honeywell
In Canada: Honeywell Controls Limited, Toronto 17, Ontario

Honeywell
MICRO SWITCH Precision Switches

75 YEARS HONEYWELL PIONEERING THE FUTURE

For more facts circle 482 on Reader Service Card

Begins on page 182

It cut no ice with McCoy that the employee presented a note from his doctor saying he was ill. Sure, the contract required that an employee who was ill submit a doctor's certificate—but it didn't say that the certificate was conclusive. There was other evidence that the employee just went for a medical check-up.

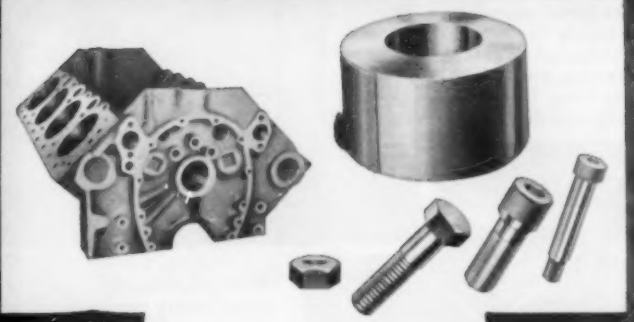
Cutting Out the Cashier's Window

The union raised some strong arguments against cutting out the cashier's window and other personal employee services—but the arbitrator brushed them aside.

When sales slough off, the plant executive is usually given the word to CUT. At a machine and tool factory, employees used the cashier's window and the personnel office for the transaction of personal business, cashing checks, purchasing American Express money orders, and so on. Clerical personnel were cut back because business was bad. To keep from overloading the reduced staff, the company announced that the sale of money orders would be discontinued and the use of the two offices would be limited to the lunch hour and after 3 o'clock. The union kicked. The company compromised by permitting employees to use the two offices and to buy money orders after they obtained a job card rung in and signed by the foreman. But then the union insisted that employees be paid when they used these services. At this point the company refused to budge.

The arbitrator ruled that the services had never been bargained for with the union. They were instituted unilaterally by the company before the union came in. But this benefit had been enjoyed by the employees for 15 years, during which period many contracts had been negotiated. He went on to say that the elimination of pay to employees while using the services would probably result in an inconvenience to many employees. However, the practice was one peculiar to this company. It was not industrywide in application. "The fact that the company

VALVOLINE
Tectyl
protects metals against RUST



VALVOLINE'S amazing Tectyl rust preventives protect metal surfaces against *rust and corrosion* during storage and shipping.

Low-cost Tectyl compounds are easy to apply by brush, spray or dip and just as easy to remove. They protect metal surfaces against the effects of snow and rain . . . salt air, humidity, perspiration and corrosive fumes.

Tectyl rust preventives meet exacting government specifications.

Write today for these two helpful Tectyl charts

1. "Valvoline Tectyl U. S. Government Approved Packaging and Preservative Chart." Gives the Army, Navy, Air Force and other Government Agencies' specifications and applications.

2. "Valvoline Tectyl Industrial Rust Preventive Comparison Chart." Specifies applications covering the industrial field.

VALVOLINE Tectyl RUST PREVENTIVES

VALVOLINE OIL COMPANY, Freedom, Pennsylvania
A Division of Ashland Oil & Refining Company

For more facts Circle 483 on Reader Service Card

THE BRIDGE TO *Progress* AND *Safety*...

The bridge in this picture, designed to carry both horse power and man power across the Root River, represents a step to further expansion of Western Printing and Lithographing Company facilities in Racine, Wis.

Western selected Globe's Safety GRIP-STRUT grating on this bridge for greater safety and for greater economy. Safety GRIP-STRUT is the new basic material, all in one piece (including channels), not welded, riveted or expanded, in steel or aluminum, in standard sizes and gauges. It presents an open space, in a diamond pattern, in excess of 55% of the area for a positive NON-SKID footing in all directions. It is also ideal for work platforms, stair and ladder steps, flooring, balconies, catwalks, machinery guards, fire escapes and for original equipment safety treads.

IMPORTANT SAFETY FEATURES:

Fire proof, slip proof, maximum strength, minimum weight, easy to stand and walk on, cool in summer, warm in winter.

BIG ECONOMY FEATURES:

For balconies—no extra light needed below—no extra heat. No extra supports needed—Channels are integral part of the material. No secondary sprinkler heads necessary. Self cleaning. Cut and installed like lumber by your own maintenance force. Low in original cost.

Write for new complete catalog. Distributors in all principal cities. Consult yellow pages in phone book under "GRATING".

GRIP-STRUT PATENTED

PRODUCTS DIVISION

THE GLOBE COMPANY

4014 S. PRINCETON AVENUE
CHICAGO 9, ILLINOIS

Begins on page 182

had agreed to continue the availability of the services during the entire work day is indicative of the company's intent to maintain a friendly cooperative relationship with the union and the deduction of pay for those using the service during working hours is certainly not unreasonable where the facts clearly show that this company is in a serious struggle to continue in business."

"This is the type of benefit which, if eliminated, may assist in obtaining other more substantial and enduring benefits such as increased employment, improved financial stability for the company, and job security for the worker."

The arbitrator also pointed out that this benefit was not a bonus or part of the wage structure because of its long continuance. It was not to be considered as such for this reason: Although it was available to all employees equally, there was no evidence that all used it equally.

Protecting Seniority

The grievance route is the proper way for an employee to protect his seniority. This court refused to by-pass it.

As a rule, employees who feel that they haven't been properly credited with seniority—or were passed over for a promotion by ignoring their proper seniority—file a grievance with the employer through the union. And if nothing is settled that way, the subject is dumped into an arbitrator's lap for decision.

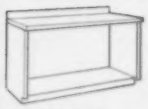
Two employees in Missouri chose to by-pass the grievances procedure. They took the company to court, seeking specific performance of the seniority provision of the union contract and reinstatement to jobs from which they had been bounced.

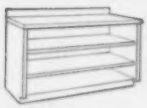
The Missouri Court of Appeals acknowledged they had come to the right court—i.e., that it had jurisdiction over the case. But this was small solace, because the court ruled that it did not have the power to order specific performance of a seniority clause. There was no precedent for such an order in Missouri. The court also noted that other state courts would not have issued such an order.

For more facts Circle 484 on Reader Service Card

HALLOWELL

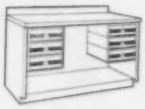
CABINET BENCHES

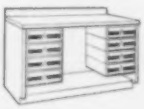

Model 608-Basic Bench

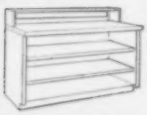

Two adjustable shelves

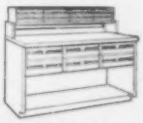
Two shelves, sliding doors and lock

Two 2-drawer tiers


Two 3-drawer tiers

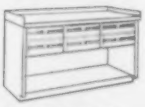

Two 4-drawer tiers

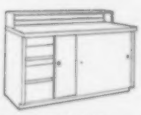

Two shelves and top shelf


Drawer tiers and storage wall

Two shelves, sliding doors and drawer tier

Electrical panel, shelves and sliding doors


Three 2-drawer tier units


Top shelf, shelves and sliding doors

There is a standard HALLOWELL Cabinet Bench for every job. Drawers, doors, electrical panels or test panels, shelves and other interchangeable accessories give you what you need *now*—yet enable you to rearrange or add as work requirements change. Built to last indefinitely. Ask your HALLOWELL distributor for full information, or mail coupon below.

COLUMBIA-HALLOWELL Division SPS
Jenkintown 11, Pa.

Please send me the full line Hallowell Shop Equipment Catalog.

NAME_____
Please Print

COMPANY_____

ADDRESS_____

CITY_____ ZONE_____ STATE_____

COLUMBIA-HALLOWELL Division **SPS** JENKINTOWN 11, PA. • SANTA ANA, CALIFORNIA

where reliability replaces probability

For more facts Circle 485 on Reader Service Card

The deck is cleared for action...

In this production-designed Butler building

Up out of the way are heating and ventilating fixtures, lights, bus ducts and cranes. All floor space is reserved for employees, their machines and materials handling equipment. This is a plant geared for production.

This is a Butler building—all 222,000 square feet of it. It belongs to Flick-Reedy Corp., Chicago, whose Miller Fluid Power division manufactures air and hydraulic cylinders. Frank Flick, president, says the working conditions in this building promote employee comfort, safety and convenience. This spells high morale, a key factor in quality production.

Flat roof structures have no such natural accommodation for fixtures, which swoop low overhead, or occupy important floor space. Butler industrial buildings, such as Flick-Reedy's, have the muscle to support heavy cranes and hoists. No need to resort to obtrusive floor cranes, or shore up overhead craneways with bulky, costly reinforcements.

You won't find heavy, expensive interior partitions in Flick-Reedy's production area. Powerful Butler rigid frames support the roof, and span wide, column-free areas. Interior supporting walls are superfluous. This is more than a major economy. It provides a spaciousness that employees like, an openness that means safety, convenience, efficiency.

There's more. Butler offers two new superior curtain wall panels: Butlerib, a handsome, precision formed panel of great strength, and Monopanl, an exclusive factory-insulated panel—both in factory-applied colors. You'll like them. Consult your Butler Builder (in the Yellow Pages), or write direct.

BUTLER MANUFACTURING COMPANY
7375 East 13th Street, Kansas City 26, Missouri

BUTLER

Manufacturers of Metal Buildings • Equipment for Farming, Oil Transportation, Outdoor Advertising • Contract Manufacturing
Sales Offices in Los Angeles and Richmond, Calif. • Houston, Tex. • Birmingham, Ala. • Kansas City, Mo. • Minneapolis, Minn. • Chicago, Ill. • Detroit, Mich. Cleveland, Ohio • Pittsburgh, Pa. • New York City and Syracuse, N.Y. • Boston, Mass. • Washington, D.C. • Burlington, Ontario, Canada

For more facts Circle 486 on Reader Service Card

For more facts Circle 487 on Reader Service Card ➤

NEW FALK EQUI-POISED MOTOR MOUNT

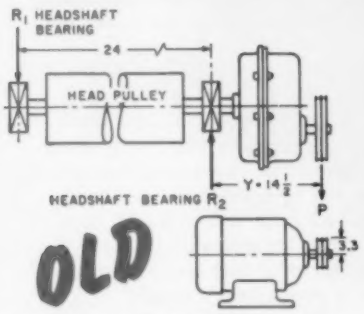
gives unequaled economies plus convenience

HOW A FALK EQUI-POISED MOTOR MOUNT REDUCES BEARING LOADS ON A DRIVEN MACHINE

GIVEN: Motor—15 hp, 1750 rpm, Frame 284U, Weight—320 lb.
Sheave diameters—6.6/9.4
Driven machine—belt conveyor with 24" center distance between headshaft bearings.

NOTE: Weights of 307J24 Shaft Mounted Drive, sheaves, and V-belts are eliminated from calculations because they remain constant; do not affect the comparison.

WITHOUT FALK MOTOR MOUNT



Torque at motor shaft = $\frac{63{,}025 \times 15 \text{ hp}}{1750 \text{ rpm}}$ = 540 lb-in.

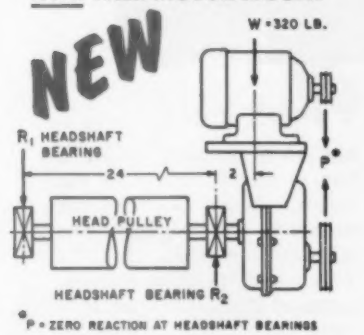
Belt pull (P) = $\frac{540 \text{ lb-in.}}{3.3"}$ x 1.5 Load Connection Factor
= 246 lb

$R_2 = \frac{246 \text{ lb} \times (24" + 14.5")}{24"}$ = 395 lb

$R_1 = \frac{246 \text{ lb} \times 14.5"}{24"}$ = 149 lb

(Check: 395 lb—149 lb=246 lb)

WITH FALK MOTOR MOUNT



*P = ZERO REACTION AT HEADSHAFT BEARINGS

V-belt pull has zero reaction on headshaft bearings. Therefore—

$R_2 = \frac{320 \text{ lb} \times (24" + 2")}{24"}$ = 347 lb

$R_1 = \frac{320 \text{ lb} \times 2"}{24"}$ = 27 lb

(Check: 347 lb—27 lb=320 lb)

Falk's new EQUI-POISED* Motor Mount is a rigid, all-steel weldment, pre-drilled for bolting standard NEMA foot-mounted motor (1/2 to 30 hp) directly to the steel frame of Falk Shaft Mounted, Flange Mounted and Screw Conveyor Drives. With it, motor can be mounted in almost any position around perimeter of reducer.

(*Balancing of forces.)

Substantial Savings for You

It saves engineering time required to design special motor bases and foundations...saves cost of labor and materials required to build special motor foundations...and saves on equipment costs by using a quality stock component. Further, its quick installation and easy maintenance mean added cost savings. The Motor Mount is a space saver, too. Where restricted space is a factor, ability to mount motor in any of several positions is an important convenience...For information on range of sizes, dimensions, etc., contact your Falk Representative or Distributor—or write direct for Bulletin 7100.

THE FALK CORPORATION, MILWAUKEE 1, WISCONSIN

MANUFACTURERS OF QUALITY GEAR DRIVES AND FLEXIBLE SHAFT COUPLINGS

FALK

a good name in industry

Representatives and Distributors in most principal cities

FALK is a registered trademark

Are Executives on the Way Out?

Want to be a big wheel in a large company? Your chances of succeeding are less than they were last year. Results of a recent poll, conducted by Executive Manpower Corporation, New York City, indicate a current need for about 2.5 top men per company to fill important jobs.

Last year a similar inquiry showed that large companies wanted an average of 3.2 executives for openings paying from $10,000 to $100,000 a year.

Of the jobs currently available among the participating companies, the biggest need is for sales executives (27.1%), followed by management engineers (22.5%). Last year the biggest need was for production executives (25.7%).

Depression Aftermath

The low birth rate during the depression years will make itself felt on the labor scene during the coming decade. Despite the fact that the national labor force is expected to rise from 73 million to 87 million during the '60s, there will be a decline in the number of workers in the prime age bracket of 35 to 44. These figures were included in a recent speech by Under Secretary of Labor James T. O'Connell at Charleston, S.C.

Executives or Yes Men?

Do you really want creative young executives in your company? Or are you looking for flunkies—glorified yes men? Louis E. Wilson, speaking before the Executives' Club of Chicago, claimed that too many companies expect their employees to be the latter.

Companies discourage their executives from pioneering and exploring, said Wilson. And press them increasingly into conformity. Sometimes without realizing it, companies encourage and even order their executives to do as others have done before. They look askance at originality and initiative.

Anatomy of a Big Wheel

What does it take to be boss man of one of America's top corporations? Osborn Elliott, in his recently published book, "Men at the Top," says that these men have qualities in common that are not found in the run-of-the-mill executive.

Such men are usually happy types, says Elliott, full of drive and energy. To get where they are today and to stay there, the men at the top work harder, for longer hours, and more effectively than other men. They are ambitious, like power, money, and prestige. They're full of confidence, exude vitality. They enjoy and are even obsessed with their work. Most of them dread retirement.

Although these men get tired and tense, they are seldom candidates for a psychiatrist's couch.

Youth Takes a Back Seat

Young workers had better look to their laurels if they have any, according to recent findings of the U.S. Department of Labor. Almost 40% of the nation's office work force are 45 years or older. The average performance of sizable numbers of older workers exceeds that of the younger set. In addition, older workers have a steadier rate of output than their younger counterparts.

On this basis, the Labor Department cautions employers not to try to stereotype workers by age groups, but to use individual evaluation methods.

Turn the page

JOHNSON V-530 PRECISION PILOT POSITIONER

FOR RUBBER DIAPHRAGM OPERATED VALVES

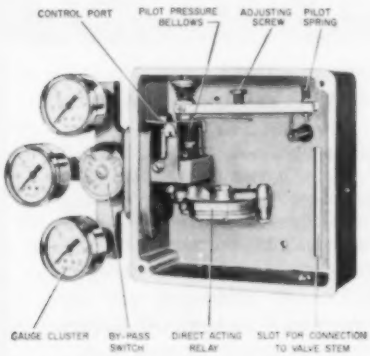
V-530 PRECISION PILOT POSITIONER

The Johnson V-530 Pilot Positioner is designed for application to the larger size valves for precise repositioning even for very small changes of air pressure from the controlling instrument.

- *Powerful* — repositions with maximum power at all times. Utilizes supply air at 15-20 psi; does not operate from control air from controlling instrument.
- *Fast* — proportional action, direct acting pneumatic relay repositions valves approximately six times faster than ordinary pilot positioners.
- *Accurate* — adequate air handling capacity for the larger valve tops. Positioner completely eliminates influence of stuffing box friction or of fluctuation of steam or liquid pressures.
- *Low Air Consumption* — uses no more air than an ordinary room thermostat. Minimizes compressed air requirements.
- *Easily Adjustable* — a single screw beneath the cover adjusts operating range between 3-16 psi and starting point between 0-20 psi.
- *Options* — available with by-pass switch for uninterrupted operation during servicing. May be equipped with gauge cluster to show supply pressure, pilot pressure, and output pressure to the valve top.

For complete details, write for Bulletin V-530. Johnson Service Company, Milwaukee 1, Wis.

PILOT POSITIONER APPLIED TO VALVE



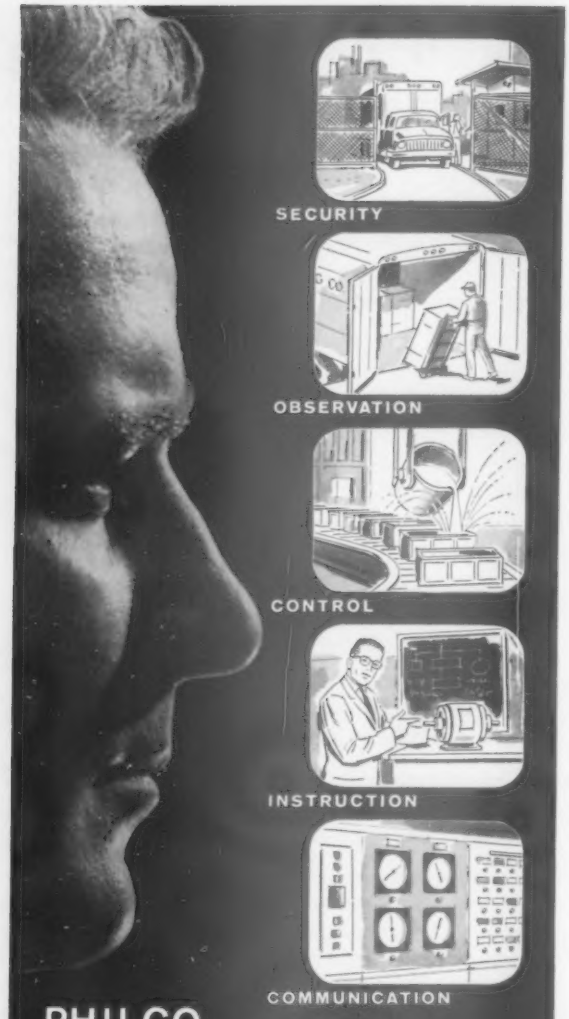
PILOT POSITIONER WITH COVER REMOVED

OUR 75TH YEAR

JOHNSON CONTROL

PNEUMATIC SYSTEMS

DESIGN • MANUFACTURE • INSTALLATION • SINCE 1885



PHILCO

Closed Circuit TV

Provides greatest flexibility . . . utility . . . economy

If you are considering CCTV in *your* plant, it will pay you to consult Philco . . . pioneer in all-transistor closed circuit TV. Philco equipment is engineered for complete reliability and freedom from maintenance. It is as easy to operate as your home TV. Write for information and your copy of the Philco Guide to TV in Industry.

Government & Industrial Group

4700 Wissahickon Ave., Philadelphia 44, Pa.

In Canada: Philco Corp. of Canada, Ltd., Don Mills, Ontario

PHILCO®

Famous for Quality the World Over

Begins on page 198

Engineers Look for Green Stuff

The day of the wide-eyed idealistic scientist or engineer, whose satisfaction lies in seeing a job well done, has passed, in the opinion of Prof. Lee E. Danielson of the University of Michigan.

In his book, "The Characteristics of Engineers and Scientists," Professor Danielson claims that today's egghead, while still intensely interested in his work, also wants cash and recognition.

In fact, many consider their technical training as only a means to an end. Once employed, they attempt to move out of technical fields and into more lucrative ones—such as management or sales.

Shunning Human Booby Traps

Safety in the plant should begin in the personnel office, not with fancy posters and clever slogans, says Milton C. Addington in a recent article in the *American Association of Industrial Nurses Journal.* Most accident-prone persons have characteristics that can be spotted in an employment interview. Interviewers should keep a sharp eye cocked for the applicant who:

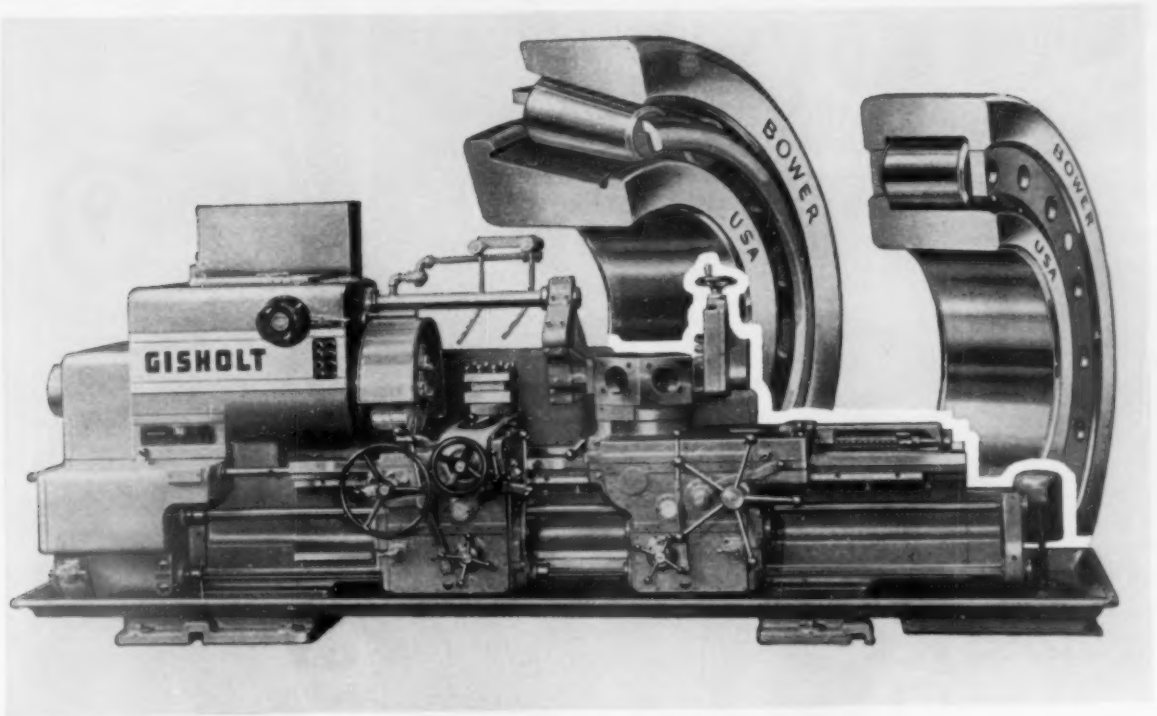
- Concentrates upon daily pleasure, with little interest in long-term goals.
- Changes jobs frequently.
- Dislikes discipline, abhors routine.
- Has a cavalier attitude toward sex and family.
- Is self-centered, frequently narcissistic.
- Is impulsive.
- Resents persons in authority.
- Has a long record of plant accidents.

Rotate Jobs to Develop Men

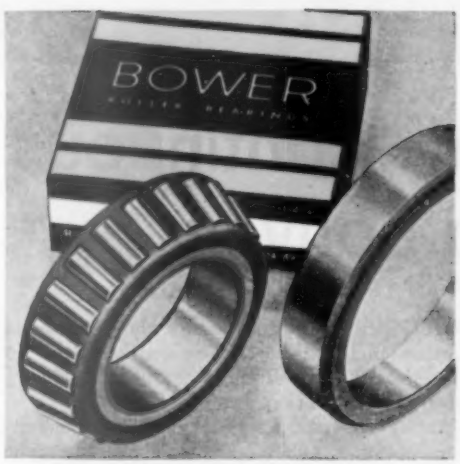
Key to a corporation's program for developing executive talent is a job-rotation system, says David H. Dawson, a vice president of E. I. du Pont de Nemours & Company, Wilmington, Del.

Dawson, in addressing the recent annual meeting of the National Association of Printing Ink Makers, urged that management "keep a man in a given job

Better products, *faster*, from your Bearing Specialist:



Bower Roller Bearings...the finest to keep production levels up...costs down!



You can rely completely on Bower bearing quality and high availability for every replacement need to keep machines in service!

It pays to make replacements with Bower, the bearings used by the original equipment manufacturers. Maintenance men know the importance of this practice, especially when Bower tapered or straight roller bearings are used by leading machinery makers. They also know the importance of ready availability for fast service.

Call in your Bearing Specialist. Let him show you firsthand the refinements of Bower bearing design. He'll point out the features engineered to insure better roller lubrication and to provide the minimum of running friction. He's always nearby.

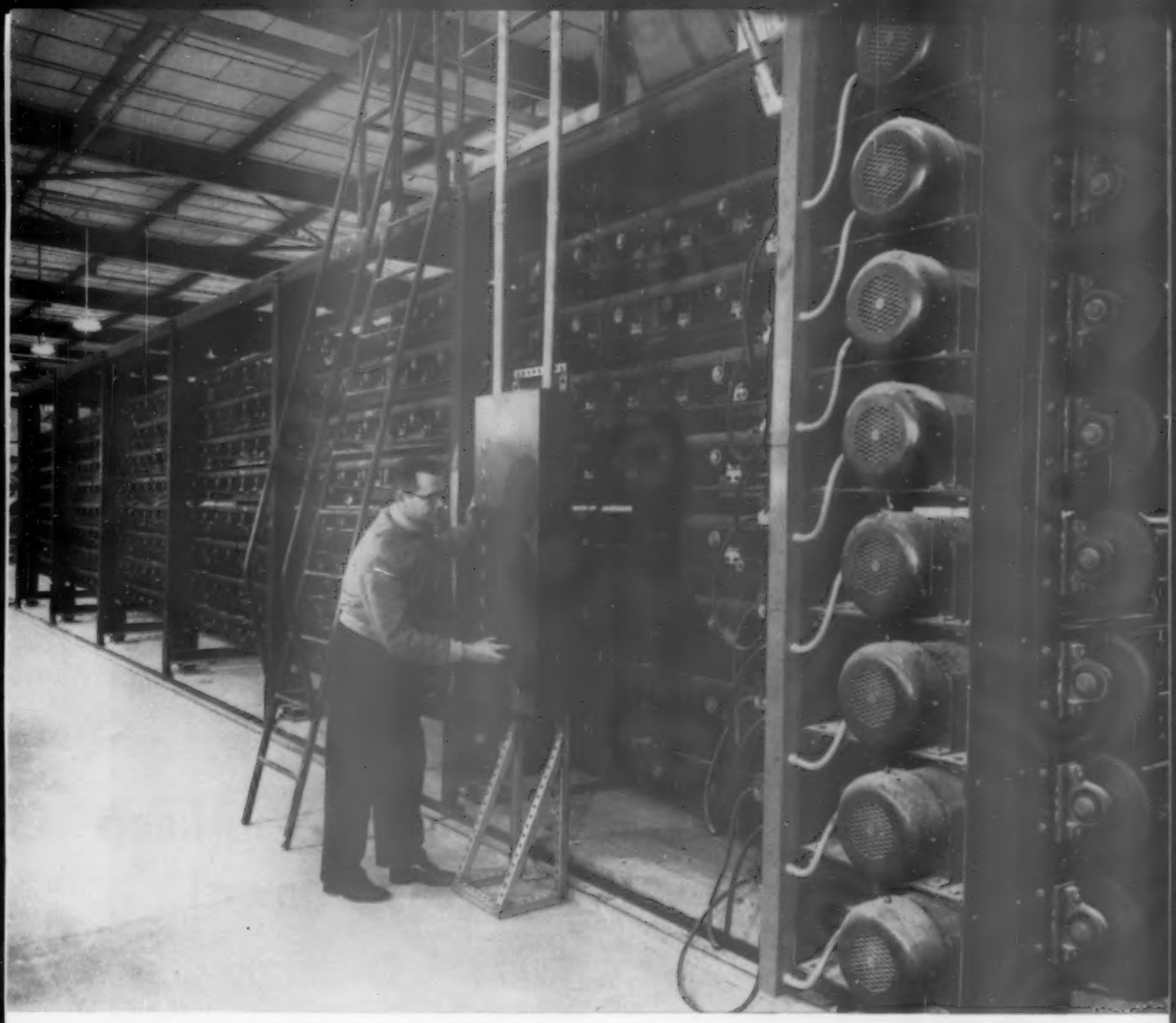
BOWER ROLLER BEARINGS

BEARING BOWER ROLLER BEARINGS SERVICE

FEDERAL-MOGUL SERVICE

DIVISION OF FEDERAL-MOGUL-BOWER BEARINGS, INC. • DETROIT 13, MICHIGAN

For more facts Circle 490 on Reader Service Card



Century motors provide continuous operation for oven conveyor

Eight Century 2-horsepower, squirrel-cage, totally-enclosed-fan-cooled motors accelerate materials onto an 8-deck feed-in conveyor at precise feed-in speeds.

At the end of this conveyor system is an oven. Materials must enter this oven at continuous speeds, and materials must be delivered to the oven constantly during each plant shift. A comparable 8-deck conveyor system is at the other end of the oven to remove the baked materials for cooling and stacking.

These eight Century motors assure the continuous flow operation pictured here. Top-quality Century motors provide the dependability required for long hours of stop-start operation.

Your Century sales and application engineer, a full-time motor specialist, can help you choose the right motor for your needs from Century's full line of from 1/20 to 400-horsepower motors. Just contact him or your authorized Century motor distributor.

CENTURY ELECTRIC COMPANY

St. Louis 3, Missouri *Offices and Stock Points in Principal Cities*

For more facts Circle 491 on Reader Service Card

Century

60-12

Begins on page 198

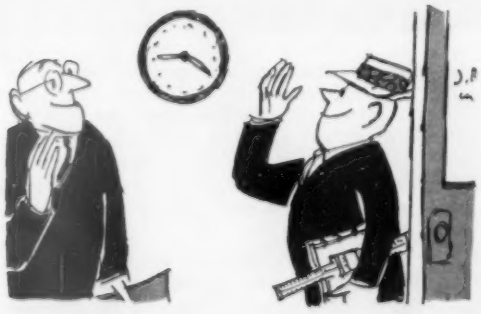
only as long as proves necessary for him to show he has mastered it and is capable of broader and more demanding responsibilities.

"At some point in a man's career, knowledge of the operation in breadth as well as in depth is essential; at all levels it is helpful," he concluded.

Snaring the College Grad

How effective is your campus recruiting program? Industry as a whole does a pretty fair job, but there's plenty of room for improvement. This conclusion is drawn from a recent survey of college placement officers by the American Management Association, New York. Seven suggestions are offered:

1. Spend more time in the interview discussing a candidate's interests—less time on data about the company that can be presented in written form.
2. Include specific job descriptions in recruiting literature—less generalizations and glamor.
3. Don't waste the time of students with less than a B average if you are not going to consider them for employment.
4. Tell students what their first tasks will be like, so they won't resent any menial jobs.
5. Don't eliminate a student because he doesn't seem to fit into a mold. He may turn out to be your best bet on a long-term basis.
6. Put more emphasis on liberal education.
7. Put less emphasis on personal impressions.

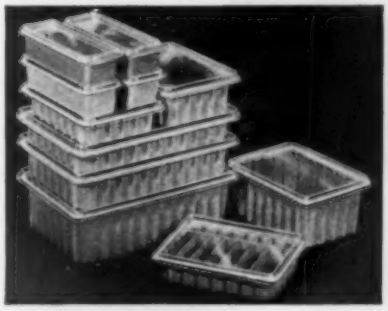


I'm Late! So Who Cares?

Most professional workers who miss the 7.22 a.m. suburban express don't have to slink sheepishly past the boss's desk when they reach the office late.

A survey of 25 companies conducted by *Industrial Relations News*, New York, shows that anywhere from 3 to 33% of white-collar workers are tardy on any given day. Despite this fact, few companies have formal policies on lateness. All companies claim that punitive measures such as warnings and discharge could be handed out to chronic offenders. But no company reports having taken such action.

For Greater Production and Storage Efficiency



use NEW all-purpose

P-C PRODUCT CONTROL BOXES

Made of tough, durable, lightweight co-polymer. Clear butyrate covers. Polyethylene dividers optional. For almost anything solid or liquid—small metal or plastic precision parts, food, oils, chemicals, etc. Long-lasting, resistant to dirt, damage, aqueous acids, alkalies and salt. Easy to stack. Exceptionally low quantity prices. Immediate delivery of standard sizes from stock.

★ SPECIAL FIRST ORDER BONUS OFFER ★
Write for complete information and price list—

PANEL CONTROLS DIVISION
EXPORT CORPORATION
13314 FOLEY AVE., DETROIT 27, MICH.
Phone: WEbster 3-5801

For more facts Circle 492 on Reader Service Card

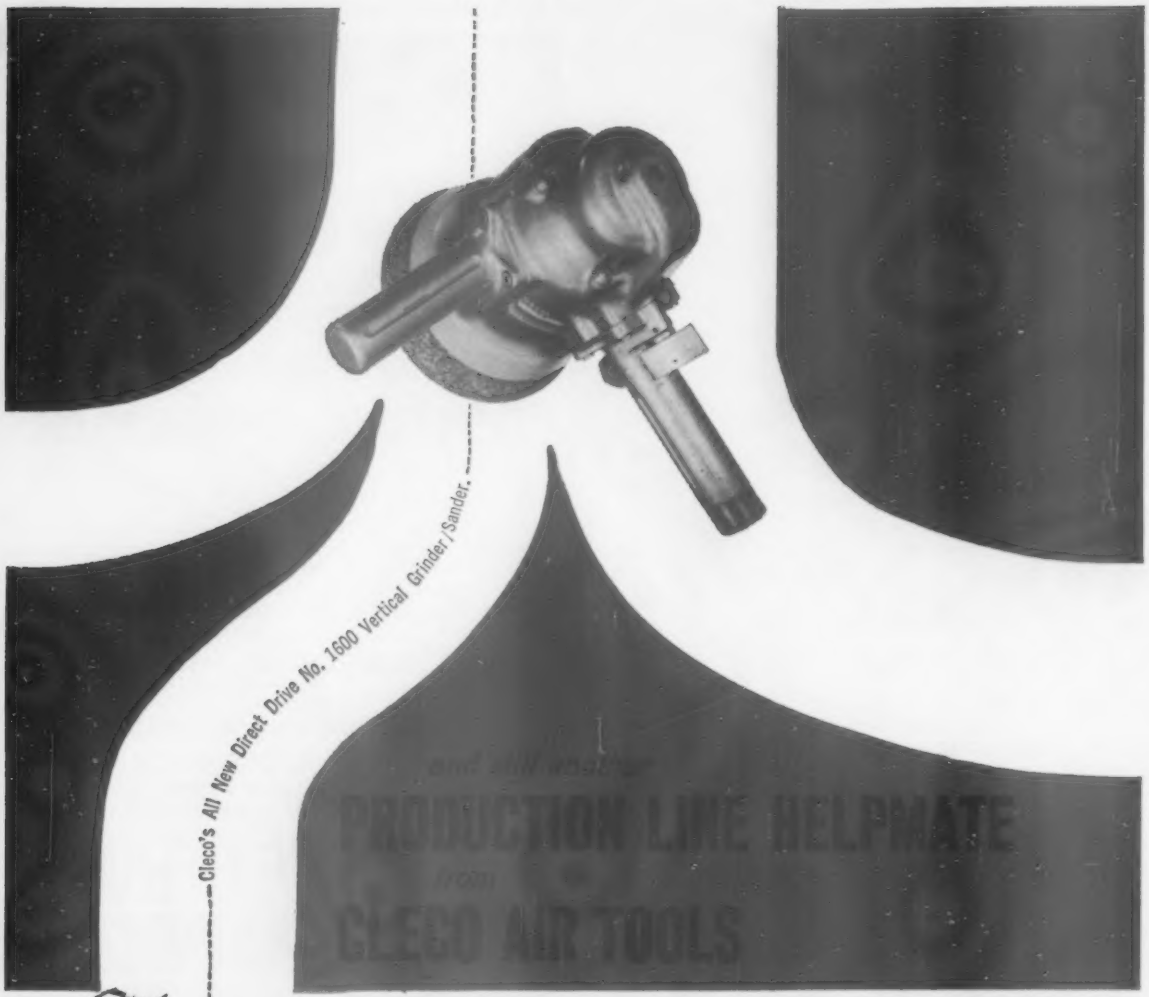
KEEP YOUR MEN HOPPING... ON "CARPET-SAFE" FLOORS!

SOL-SPEEDI-DRI®
spreads in seconds, works in minutes... cleans, absorbs oil, grease, liquids for weeks!

All it takes is one man with a rake or broom and a bag of SOL-SPEEDI-DRI to do the job. Super-absorbent SOL-SPEEDI-DRI granules soak up deep deposits from pores of wood or concrete! Non-burning, mineral SOL-SPEEDI-DRI smothers fire! Inexpensive, reusable until completely saturated. Each lb. contains over 13 acres of absorptive area.

For useful Free Sample write—
SPEEDI-DRI DIVISION
Minerals & Chemicals Corporation of America
180 ESSEX TURNPIKE MENLO PARK, NEW JERSEY

For more facts Circle 493 on Reader Service Card



This direct drive—governor controlled, vertical grinder/sander is a production booster. It maintains a safe high speed with medium-heavy work loads (where most of your grinding is rated). Cleco's No. 1600 Grinder has a high-strength, heat-treated aluminum casing and a built-for-safety, heavy spring governor. Its casing is constructed in one-piece, giving you a light weight tool that can take the bumping and dropping you know it will receive. This feature plus the tool's inherent low maintenance features will endear the No. 1600 Grinder to every maintenance department.

OTHER IMPROVEMENTS INCLUDE: A choice of throttle arrangements . . . 1) Butterfly on-and-off safety throttle; 2) Butterfly on-and-off with throttle detention; 3) Standard lever throttle. A dead handle that can be positioned from 90° to 120° from throttle handle, or it may be removed entirely for close work. A remarkably safe, stainless steel governor that can be custom-set to your air pressure.

CLECO'S No. 1600 Grinder/Sander weighs only 7½ lbs., is 7 ins. high, and utilizes a 6 in. cupwheel. Available in three speeds: 4500, 6000, and 8000 r.p.m. FOR A DEMONSTRATION-TRYOUT, CALL YOUR LOCAL CLECO® REPRESENTATIVE. FOR DESCRIPTIVE LITERATURE, WRITE:

A Division of REED ROLLER BIT COMPANY
P. O. BOX 2119 • HOUSTON 1, TEXAS
IN CANADA: Cleco Pneumatic Tool Company of Canada, Ltd.
927 Millwood Road, Leaside (Toronto), Ontario

For more facts Circle 494 on Reader Service Card

ARE YOUR ASSEMBLY LINES AS MODERN AS THE BUILDING THEY ARE IN? THEY CAN BE . . . WITH ALDEN WORK CENTERS.

The Alden Work Center permits a unit by unit creation of an integrated assembly line of any length, for either manual or automatic manufacture, all from standard "Building Block" components. It insures the use of most efficient methods . . . fast flow of parts and materials . . . proper stock control and minimum human effort.

Alden Basic Work Center Frame (may be expanded to any desired length by adding units). Note Alden Power Channel which supplies all plant services to each work position — gasses, electrical, liquids.

Alden Work Center assembly line with conveyors and lighting . . . made up completely of Alden Systems components.

Individual work taps may be slipped into or out of the frame as desired.

You can profit by having the ultimate in line flexibility constantly available . . . by operating in less space . . . increased line efficiency . . . reduced in-process inventories . . . reduced engineering, supervision, direct labor, maintenance and set up costs.

Write today for the new Alden Systems Handbook which includes catalog and price information.

ALDEN SYSTEMS CO.

ALDEN RESEARCH CENTER
9 WASHINGTON STREET
WESTBORO, MASS.

For more facts Circle 495 on Reader Service Card

NEW! LARGER!

Universal
METAL HOSE CATALOG!

INTRODUCING EXPANDED PRODUCT LINE

MORE TECHNICAL DATA

SIZE RANGE INCREASED

Ask for Catalog ID-100D

QUALITY . . . *All-Metal* Flexible Hose Products

Universal METAL HOSE CO.

2147 So. Kedzie Ave., Chicago 23, Ill.

For more facts Circle 496 on Reader Service Card

fewer workers can clean your building

CLEANER – AT LESS COST...

with the ISC Work Standards System!

Modern cleaning equipment is not enough:—it takes the Work Standards System to cut costs and raise productivity. Today, higher production per man-hour has compensated for higher wages in almost every field. In the building maintenance field, however, the productivity of the average cleaner has remained static.

Industrial Sanitation Counselors has, for twenty years, studied the problems of building sanitation. By applying the Work Standards System, yearly cleaning costs have been reduced by 30 to 40% for many of America's office buildings, plants, hotels, hospitals and other institutions—and, at the same time, cleanliness standards have been raised.

ISC can set up a Work Standards System for you . . . custom designed to suit your building's particular needs. If you would like to know how this high productivity system of cleaning can save you money and raise your cleanliness standards, write for complete information today.

Monsanto Chemical Co. keeps its new World Headquarters Building cleaner at less cost with the ISC Work Standards System

Industrial sanitation counselors

2934 CLEVELAND BOULEVARD
LOUISVILLE 6, KENTUCKY

TO: ISC, 2934 Cleveland Blvd., Dept. F760
Louisville 6, Kentucky

☐ Send me the complete story on Monsanto's cleaning program

☐ Send me information about the ISC Work Standards System

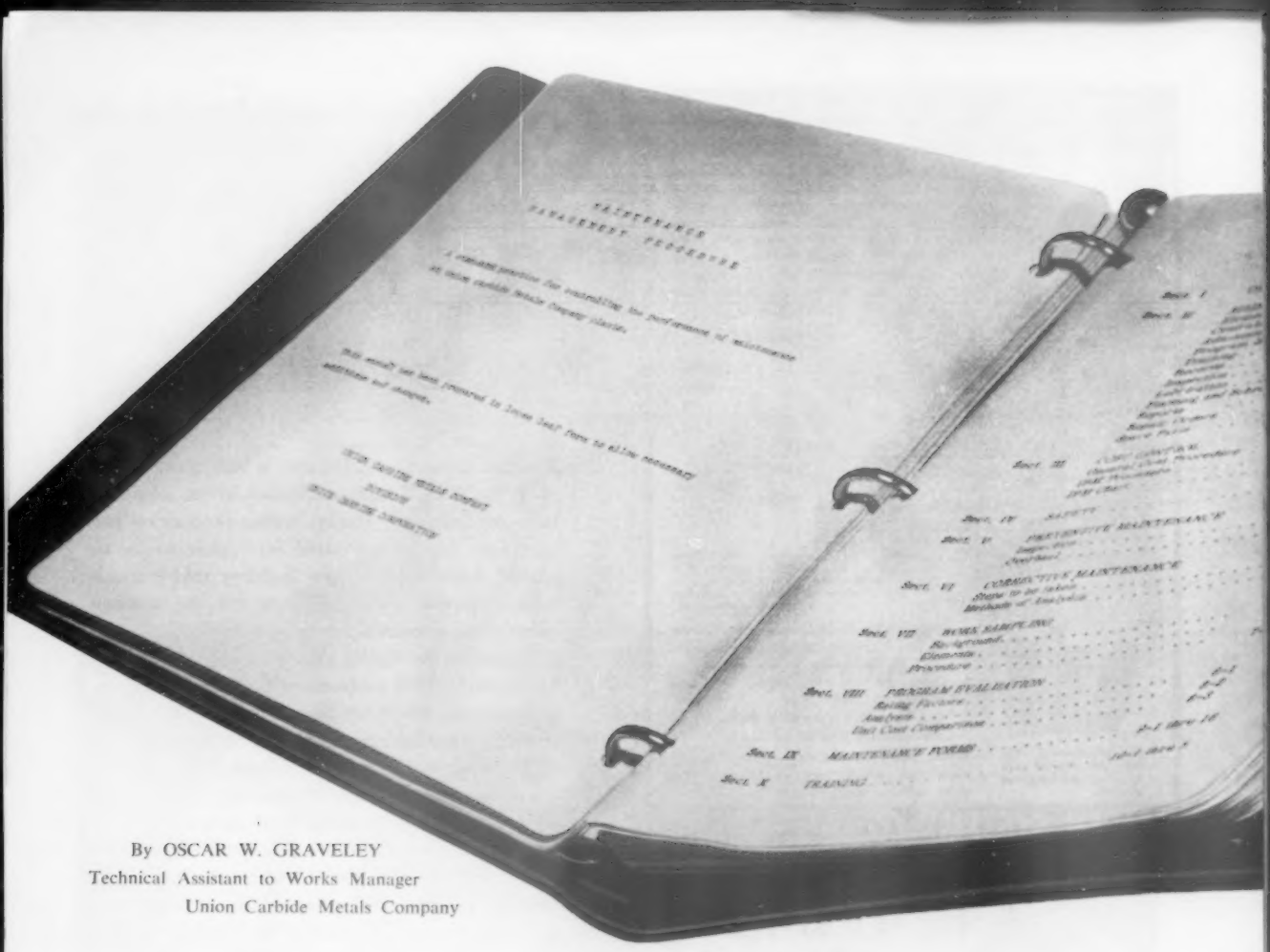
Name_____ Title_____

Company_____

Address_____

City_____ State_____

For more facts Circle 497 on Reader Service Card



By OSCAR W. GRAVELEY
Technical Assistant to Works Manager
Union Carbide Metals Company

Ten years in the making, this MANUAL DRIVES

Management at Union Carbide Metals Company (UCM) has worked for more than 10 years and has spent thousands of dollars on developing a tool to drive home a belief.

The belief: that the maintenance function should be accepted and understood as a vital part of the total management complex.

The tool: an impressive 86-page manual called "Maintenance Management Procedure" (see panel above). Since late 1958 the manual has been used to advantage by more than 250 UCM plant managers. The project started back in 1950.

Why all this effort?

B. R. Buck, vice president of operations for all UCM plants, tells why in the manual's opening pages:

"Maintenance is an increasingly important part of our over-all operations . . . Too often we have given it only lip service . . . With this procedure manual as a guide, management of each plant must have before it the common objective of placing maintenance on the same level as any other major plant operation. Also, each plant management must have these dual objectives: (1) improving maintenance procedures, and (2) reducing costs—not only through lower maintenance costs but also by higher utilization and efficiency of productive equipment."

And to show that the manual is not a one-sided document, Buck concludes: "I recommend that this manual be studied by top level management at each UCM plant and that it be criticized constructively whenever necessary. This will result in the most effective application possible."

How well has the manual accomplished its objectives? After two years' service, members of the operating divisions voice these reactions:

- The manual has given operations people a better understanding of the maintenance problem and the need for proper maintenance management. This had not been clearly understood before.
- It tells what effect operations activities have on maintenance costs.
- It encourages cooperation in planning and scheduling of work.
- It helps police the maintenance system by informing operations people what they should expect from the maintenance department.

"By following the Work Sampling section, we analyzed manpower usage, made many improvements."—Vogelberger, engineer, maintenance department (left). At right is Supt. Pishko.

"It helps us to deal more intelligently with operating department foremen and technical people."—Mang, maintenance foreman (right). With him are Weaver, asst. master mechanic (center) and Webster, maintenance foreman.

"The book's organized approach is invaluable to me."—Soeder, superintendent, engineering and maintenance (left). With him is Master Mechanic Johnson.

HOME the MAINTENANCE MESSAGE

On the other side of the coin, the maintenance department reports that it has derived these benefits through the manual:

- It is an accepted guide for all administrative duties, and for organization of work.
- It is gradually correcting the poor maintenance management practices that had crept in, and is improving managerial ability.
- With these standard procedures, a maintenance employee can go from one UCM plant to another. He is able to fit into any spot in the organization without retraining in new methods.

WHAT THE MANUAL CONTAINS

A photo of the index page of the manual is shown in the panel above. Here are the highlights of each section as listed:

Objectives (1 page).

- To provide a maintenance management program that will allow maximum operating time of equipment at minimum maintenance cost, and will afford proper protection of capital investment.
- To provide a means of collecting costs.
- To establish an accurate method of evaluating work performance.
- To aid in implementing safe working conditions.
- To improve, through training, the skills of maintenance supervisors and hourly men."

Maintenance Management Procedure (23 pages). This is largely an instructional treatise on what elements compose a good maintenance program, and how to install and administer them. The maintenance manager is told: "This program provides the tools for maintenance management, but will not substitute for a competent manager." Operating people are inspired to be more cooperative when they read an item such as: "Equipment must normally be made available for inspection or repair on schedule unless there is a real operating emergency . . . The operating foreman takes part in all planning and scheduling of maintenance work in his department." And operating people gain confidence in the maintenance function when they realize maintenance work is being performed on a knowledgeable, intelligent, and systematic basis.

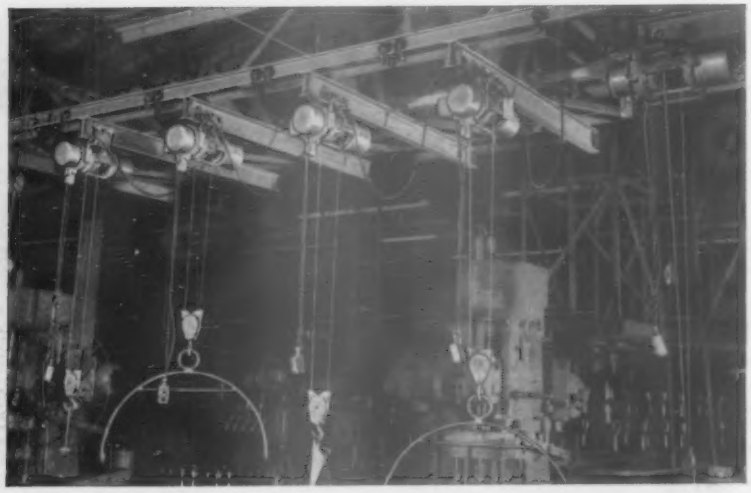
Turn the page

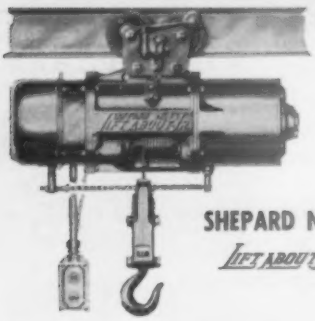
SHEPARD NILES

LIFTABOUT-JR.

EASES WORK

. . . on your production line



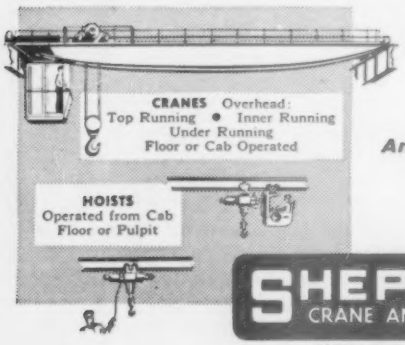


KEEP PRODUCTION on the move

. . . with a Shepard Niles Liftabout-Jr. This husky, light-service hoist does all your back-breaking lifting . . . enables one man or woman to move more material at lower cost.

Low in cost, the Liftabout-Jr. features dependable wire rope hoisting. Available in 250, 500, 1000 or 2000 lb. capacities . . . parallel or cross-mounted with bolt, hook or trolley suspension.

SHEPARD NILES LIFTABOUT-JR.



• Write for latest Liftabout-Jr. Bulletin . . . and ask to have a Shepard Niles representative call.

America's Most Complete Line of Cranes and Hoists Since 1903

SHEPARD NILES
CRANE AND HOIST CORPORATION

3378 Schuyler Ave., Montour Falls, N.Y.

MAINTENANCE MANUAL

Begins on page 206

Costs (11 pages). Explains the objectives and uses of the basic forms—time card, repair order, stores issue—and shows the importance of proper classification of accounts to get accurate costs. There follows a comprehensive report on principles and use of punched-card systems. Reason: A good understanding eleminates errors.

Safety (5 pages). Deals with company policy on all worker safety. Stresses safe working methods and maintenance of safe equipment and surroundings. Points out need for top priority on jobs that correct unsafe conditions.

Preventive Maintenance (5 pages). Describes basic philosophy and advantages of PM, explains mechanics of starting a program. All who read the manual are warned: "Diverting preventive maintenance personnel from their duties to improvement-type projects will lead to major deterioration of a plant. It should be permitted only for jobs of a critical or emergency nature."

Corrective Maintenance (4 pages). Recommends steps (as in work simplification) to find a better way to do a maintenance job, or even eliminate it. Presents job analysis questionnaire, and suggests sources of data for study.

Work Sampling (7 pages). Reviews briefly its theory and application in maintenance. Suggests breakdown of elements of worker activity for a WS study. Tells what can be learned—such as efficiency of maintenance management.

Maintenance Program Evaluation (9 pages). Purpose here is to help maintenance management check its success on the basis of the percentage of management practices that UCM has adopted. Also describes two tools for management control: (1) cost reports for comparison with past, (2) derivation of unit costs (per ton per operating department, or per service unit) for inter-plant comparison.

Forms (16 pages). This section covers only those key forms required in the direct management of maintenance. (Inspection and allied forms appear in a separate manual of standard procedures.) There are 10 forms in all: repair order,

For more facts Circle 498 on Reader Service Card

For more facts Circle 499 on Reader Service Card ➤

JANITROL

presents the new and versatile

52 series

AIR-COOLED AIR-CONDITIONER

A PRACTICAL APPROACH TO ECONOMICAL, HIGH EFFICIENCY COOLING FOR COMMERCIAL—INDUSTRIAL BUILDINGS

advance designed for the sixties

NEW JANITROL 52 SERIES AIR COOLED AIR CONDITIONERS

Outwardly beautiful and pleasing to the eye, inwardly rugged and powerful, new Janitrol 52 Series units combine years-ahead styling and cooling performance . . . provide truly low-cost central cooling with matchless reliability and performance.

JANITROL'S ADVANCED DESIGN . . . A SAFEGUARD AGAINST PRODUCT OBSOLESCENCE!

The weatherproof, high-efficiency 52 Series condensing unit, containing all moving refrigeration parts, installs outside. Available in six basic capacities from 22,200 to 110,200 btu/hr.

Full A.R.I. certification: Every Janitrol unit meets all standards of Air Conditioning and Refrigeration Institute.

STANDARDS OF EXCELLENCE . . .

In Performance—large condensing coils assure efficient operation with outdoor temperatures up to 125°F!

In Styling—crisp, modern lines distinguish the new 52 Series. Cabinets are finished in durable, automotive-type enamel.

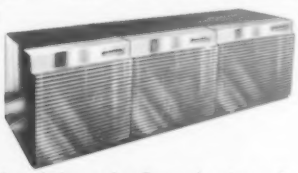
In Economy—The top-mounted fan bathes condensing coils in a jet stream of cooling air to raise efficiency and reduce current usage. Coils are shaded from the sun by louvers.

In Quietness—The powerful compressor is mounted on rubber-cushioned, resilient springs . . . cabinet is heated with special sound-deadening material.

In Safety—Complete overload and weather protection is provided. Enclosing grilles thoroughly safeguard children and pets.

In Servicing Ease—all components are easily accessible. Service panels can be removed without effecting operation during service checks.

MULTIPLE COMBINATIONS PROVIDE ECONOMICAL, HIGH CAPACITY COOLING



Modular cabinet design and upflow exhaust permit compact, multi-unit installations. Only the grilled, air-intake side of the cabinet requires clearance.

Any desired number of Janitrol 52 Series units may be installed together, with zero clearance between, to provide a variety of higher capacity combinations from 120,000 to over 1,000,000 btu/hr. Only Janitrol offers custom-built capacities at standard model cost!

JANITROL®
HEATING AND AIR CONDITIONING

MIDLAND-ROSS CORP.

A DIVISION OF MIDLAND-ROSS CORP. • COLUMBUS 16, OHIO
IN CANADA: MOFFAT HEATING & AIR CONDITIONING DIVISION
MOFFATS LTD., TORONTO 15

ALSO MAKERS OF SURFACE INDUSTRIAL FURNACES, KATHABAR HUMIDITY CONDITIONING, JANITROL RESIDENTIAL HEATING AND COOLING EQUIPMENT

JANITROL
year 'round conditioner

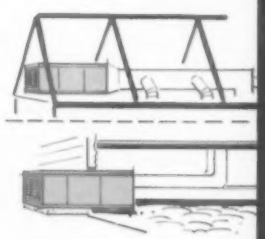
Combines quality gas heating and waterless cooling! Less than four sq. ft. of floor space needed for most installations. Features include famous Dura-Tube heat exchanger with 20-year warranty. Unique by-pass for correct air flow on heating or cooling cycle without adjustments. Powerful air-cooled 52 Series condensing unit. ADD-ON cooling—install for heating only, add cooling later.

ADD-ON COOLING

Adapts most any warm air furnace for thrifty, efficient central cooling. Cooling coil mounts in duct, attractive, air-cooled 52 Series unit goes outside. Powerful, quiet performance with outside temperatures to 125°F. Easy to install.

"J-LINE" self-contained conditioners

An economical solution for many cooling needs. One compact unit contains blower, compressor and coils. For use with ducts or as free discharge. Install through wall in crawl space, attic or other limited access locations.

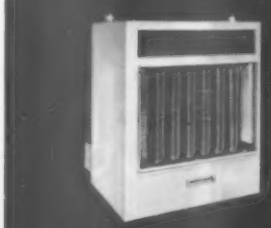


BLOWER-COIL UNITS

Smartly styled cabinet contains cooling coil and blower for use as free discharge or with ducts. Units are attached to ceiling to save floor space. Very quiet and efficient!

GAS-FIRED DUCT FURNACES

For installation in a duct where the air is circulated by a separate blower. Especially adaptable for industrial heating applications in combination with cooling. 73 Series in six sizes from 50,000 to 225,000 btu/hr. 72 Series in sizes 200,000 and 300,000 btu/hr. may be combined to provide unlimited capacity range.



MAINTENANCE MANUAL
Begins on page 206

O. W. GRAVELEY, author (left), discusses manual with W. W. Heilman, plant manager of Niagara works.

shop order, job manning schedule, department schedule, service schedule, weekly inspection report, department manning table, equipment record, craft backlog, and closed-order report.

Training (5 pages). Why training? Because, says this section, "complex equipment installations due to mechanization and automation have increased the necessity for high degrees of mechanical skill and new techniques of maintenance management." It lists management and self-improvement programs for supervisors, to include human relations, industrial relations, company policies.

WHAT IT COST

Expenses ran about $25 a page in lots of 200 copies. This sum includes cost of material and labor for printing and distribution, also time spent in planning and writing. It does not include the thousands of dollars spent in development of the management principles and practices presented. That expense has been repaid many times over in direct and indirect savings. The same will be true of the manual.

WHO GOT COPIES

First distribution was 180 copies. It has since been raised to 250. Copies went to men in all areas of management—those in operations who should understand the maintenance procedures, and those in maintenance who needed it as a guide. Copies went to: the operating vice-president and those of his staff

Flat end snubs against object and grips where rounded nose pliers would fail.
Deep cut-teeth provide secure grip. Curved sections have large, deep-broached teeth to grip pipe, etc.
Special slotted washer and chamfered nut provide lock-washer action — will not work loose.
Overlap shear action cuts better — saves edge . . . provides non-slip action.
Star chamfer holds rivet from turning — holds jaws in alignment.
Special hardening and precisely machined joints keep needle-nose jaws in line.

Tips for Measuring the Real *Work Ability* of Pliers

Check the photos above. Shown here are features you have a right to expect in a plier or cutter — features you *get* when you buy SNAP-ON.® In addition, SNAP-ON gives you —

Through hardening for extra toughness.

Broached stud-positioning hole for true bearing surface and snug, easy-working joint.

Drilled and reamed rivet holes on needle-nose for easy use.

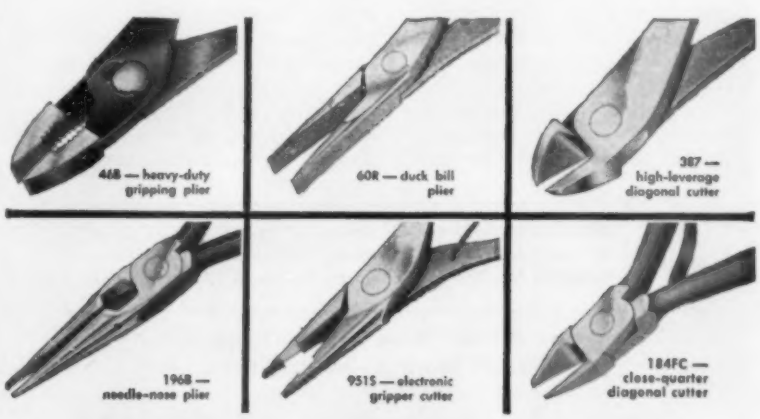
Broached and ground joint surfaces for smooth operation, snug fit.

Engineered handle design for correct leverage.

Over 60 models and sizes to let you choose the best one for your production or maintenance job.

Your SNAP-ON Sales Engineer can give you more information on the complete plier line. There's a SNAP-ON Branch Office in every major U.S. industrial center.

Or write for catalog listing the complete series, plus full range of wrenches and hand tools.


448 — heavy-duty gripping plier
60R — duck bill plier
387 — high-leverage diagonal cutter
1968 — needle-nose plier
9515 — electronic gripper cutter
184FC — close-quarter diagonal cutter

SNAP-ON TOOLS
FOR ALL INDUSTRY
8044-G 28th Avenue • Kenosha, Wisconsin

For more facts Circle 500 on Reader Service Card

Don't take our word for it—try a new RIGID Flaring Tool! See if you don't get smoother, stronger, more uniform flares . . . in less time and with less effort than ever before!

Then, compare this new RIGID Flaring Tool, feature-by-feature, with any flaring tool you've ever seen or owned:
• Feed releases automatically when flare is fully formed. • Reversing feed screw burnishes flare. • Hardened steel die bars are precision-machined. • Large, comfort-grip feed screw handle turns easily. • Precision-ground, hardened steel flaring cone, eccentrically mounted in precision bearings, produces rolling action for even metal flow . . . gives uniform flare walls without galling. • Tubing hole sizes are clearly marked. • Easy sliding rugged malleable yoke serves as stop for tubing to give correct flare size. • Yoke clamp screw fits into centering hole . . . locks bars, yoke and tubing into perfect alignment. • Stop pins keep yoke on die bars at all times . . . yoke can't slide off.

3 Models:	RIGID No. 457 for 45° flares, ⅛" to ⅝" O.D. (7 sizes) RIGID No. 459 for 45° flares, ⅛" to ¾" O.D. (9 sizes) RIGID No. 376 for 37° flares, 3/16" to ⅝" O.D. (6 sizes)

See and try these new RIGID Flaring Tools. Your Supply House has them.

RIGID Work-Saver Pipe Tools

RIGID

The Ridge Tool Company, Elyria, Ohio, U.S.A.

Begins on page 206

with maintenance responsibility; each plant manager, all operating division superintendents, superintendent of engineering and maintenance, master mechanic, all maintenance foremen, head of manufacturing office, and accounting department. The maintenance departments receiving it ranged in size from 14 to some 450 mechanics. Now they are all working from the same rule book.

At the time of the first distribution, UCM made arrangements for review of the manual by each plant manager and by division superintendents. Subsequently the latter group held a discussion session with their supervisory staffs (through each level to first-line foreman). The superintendent of engineering and maintenance also held a series of meetings with his supervisory people (running to six or more two-hour discussions) to guarantee complete understanding of the manual's contents.

Manual distribution was by numbered copies assigned to individuals or departments. A record is kept of each holder. When job changes occur, UCM requires a letter of transfer from old holder to new. If old holder is delinquent in transfer notice, he is asked for a report.

HOW IT WAS PREPARED

The author of the manual had complete responsibility for directing its preparation. Reason: He was most familiar with objectives and all operations. I am convinced this system of placing responsibility for writing a manual of this type in the lap of a single individual (who knows not only his company's practices, but also those of industry in general) is the most effective.

First we submitted a subject outline to each plant for comments and additions, which led to what became the index. We then sent out a draft of the material to be included under each subject, for further criticism. Two months later all plant engineers met to review the proposed content to clear up any fuzzy points and discuss how to make the manual more effective. The author then rewrote a final draft of the book, and resubmitted it to these engineers for com-

For more facts Circle 501 on Reader Service Card

With Texas' TEMCO it's *Acme* packaged chillers time and time again

Flow Cold packaged water chillers—
3 through 30 tons

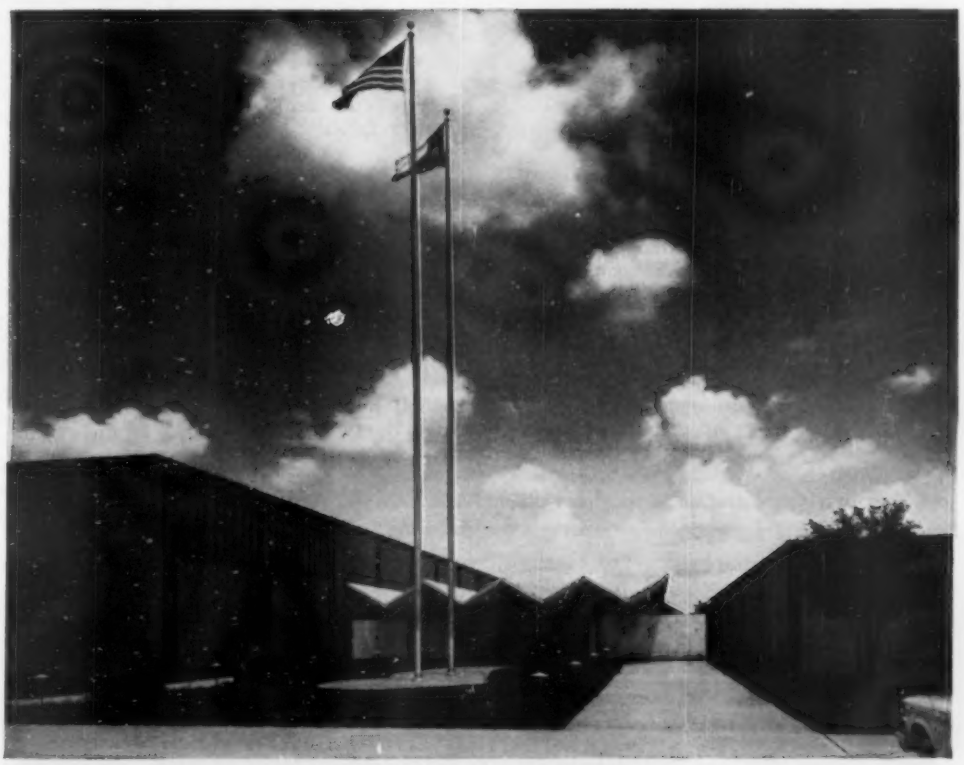
Started back in '51 . . . TEMCO Aircraft Corporation, Dallas, purchased two Acme packaged chillers to solve a problem in their spot welding operations. The problem? . . . the copper contact points of the spot welders melted and distorted without fusing the steel into an acceptable bond. The solution? . . . to circulate *cold* water through the hollow copper points to keep them cool, thus allowing the electrical charge to pass through the steel and weld without melting the copper.

To supply the cold water, Acme chillers were purchased . . . because they offered easy-to-install, space-saving compactness, high capacity efficiency, factory certified performance reliability. Was TEMCO satisfied? Well, as their manufacturing facility expanded and they needed additional chillers for spot welding and other processing operations, they came back to Acme *time and time again* . . . in July '53, March '55, June '57 and August '58, to be exact. What better evidence of customer satisfaction?

Acme INDUSTRIES, INC.

JACKSON, MICHIGAN

Manufacturers of quality air conditioning and refrigeration equipment since 1919



Administration and
Engineering Building
TEMCO Aircraft Corp.
Garland, Texas

For more facts Circle 502 on Reader Service Card

You're ahead TWO WAYS with...

ARO AIRLESS SPRAY PAINTING

AHEAD WITH

1 **ARO APPLICATION-ENGINEERED EQUIPMENT!** You get the most advanced system of Airless Spray Painting available today when you choose ARO. Precision-engineered to fit your finishing needs . . . puts new cost-saving speed and efficiency on your job. Gives you better penetration . . . better control of paint . . . cuts drift and overspray . . . less waste. A better finish!

AHEAD WITH

2 **ARO APPLICATION KNOW-HOW!** You'll find ARO's research and development background *unequaled* in depth of technical know-how for problem-solving. When you think of Airless Spray—think of ARO! Let ARO district personnel help you from start to finish! They're expert technicians in the application of airless spray painting. They'll be glad to discuss methods, equipment requirements and possible production layouts with you. ARO Distributors of Airless Spray Equipment are factory-trained, another *plus* for ARO users.

Ask for a demonstration in your own plant. We'll show you how to save money and do a better job of finishing.

ARO®

The ARO Equipment Corporation
Bryan, Ohio
Aro of California, 3141 S. Grand Ave., Los Angeles 7, Calif.
Aro Equipment of Canada Ltd., Rexdale (Toronto), Ontario
Offices in All Principal Cities

AIRLESS SPRAY PAINTING EQUIPMENT

Begins on page 206

ment. It took another meeting to iron out the kinks, and to get the text ready for printing.

Some subjects had to be treated in greater detail than others because of plant areas where details did not exist in any other form. These subjects included cost-control and punched-card procedures, application of work sampling in our type of operations, and evaluation of performance through cost analysis.

HOW IT WAS ASSEMBLED

We sought smart appearance, ease of reading, adaptability to additions or changes, and durability (we expect long and hard usage). Our high-grade 8½x11-in. loose-leaf plastic-leather binder reflects "something of value," and permits easy changes. Gold-lettered title and company name embossed on the cover add to this impression of value. The size of the manual prevents its being pocketed or mislaid.

HOW IT IS UPDATED

The responsibility for the manual's changes, corrections, or additions had to be in the hands of one person. This duty went to the author.

Each manual holder has been asked to submit in writing any suggested changes as the need occurs. These are evaluated and acted upon as merited. If necessary, prior community of opinion is sought.

New pages are forwarded to each manual holder with a "change slip" that requires a signed acknowledgment for return to headquarters.

To date, changes have been fewer than expected. This is probably due to the careful preparation and scope of the manual. Initially, many people questioned the amount of time taken in sifting details prior to the actual writing. We are now sure it was worth it.

A manual such as this doesn't take hold at once. We estimate that two to three years are needed to bring all parts into habitual practice. In fact, we spent the first six to nine months in training all participants in the use of our wholly integrated maintenance management system. END

this patented

CLIP and STUD

makes LYON your BEST SHELVING INVESTMENT

Design makes the difference! Don't settle for less than the exclusive Lyon CLIP and STUD which many have tried to copy but none can duplicate. Fully protected by Government patents, Lyon CLIP and STUD obsoletes conventional steel shelving and guarantees you these *extra dividends*—

- ★ Easy, fast, low cost assembly.
- ★ Complete flexibility—shelves instantly adjustable from the front without use of nuts, bolts or tools.
- ★ Tremendous structural strength and rigidity.

Another extra dividend from Lyon—oldest and leading steel shelving manufacturer—an experienced Lyon Storage Engineer and Lyon Dealer as near as your phone—ready to help you save space, time, money.

There are many types of Lyon steel shelving. Above—a mezzanine (double decked) stockroom in which the lower installation supports the entire second floor. A big saver of valuable floor space.

LYON STEEL EQUIPMENT ®

OVER 1500 ITEMS

For Business, Industry and Institutions

MAIL COUPON FOR THE 92-PAGE CATALOG

LYON METAL PRODUCTS, INC.
712 Monroe Avenue, Aurora, Illinois

☐ I would like to see a Lyon CLIP and STUD demonstration.

☐ I'd like a copy of your 32-page Catalog which tells the complete shelving story and covers entire line of products.

NAME _____

FIRM _____

ADDRESS _____

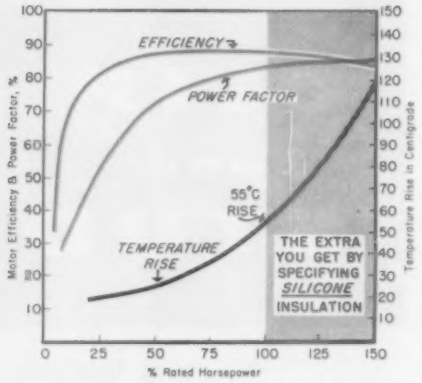
CITY _____ ZONE ____ STATE _____

A PARTIAL LIST OF LYON PRODUCTS

• Desks	• Storage Cabinets	• Bookcases	• Folding Chairs	• Sorting Files	• Tool Stands	• Cabinet Benches	• Display Equipment
• Tables	• Flat Drawer Files	• Coat Racks	• Service Carts	• Hopper Bins	• Tool Boxes	• Revolving Bins	• Hanging Cabinets
• Stools	• Drawing Tables	• Shelving	• Work Benches	• Drawer Units	• Parts Cases	• Toolroom Equip.	• Slotted Angle
• Lockers	• Filing Cabinets	• Bin Units	• Bench Drawers	• Shop Boxes	• Bar Racks	• Service Counters	• Wood Working Benches

SILICONE NEWS from Dow Corning

New Service Factor Motors Cut Costs



Specify High Service Factor Motors for lowest initial cost, lowest operating costs . . . maximum reliability.

Leading manufacturers now offer motors designed to an entirely new concept. These motors are available in standard NEMA frames of the same size used for conventional motors of the same rating, but look alikes don't perform alike.

These new motors, insulated with Dow Corning Silicones, have a built-in reserve to carry overloads of twenty-five to fifty percent above nameplate horsepower rating. Here's what this means to you:

Simplified Motor Specifications: Specify motors that are silicone insulated for high service factor. With nameplate horsepower ratings identical to nominal loads, these motors will handle temporary, or even continuous overloading. No need to calculate maximum possible load and add a safety factor. It's already built in.

More Efficient Power Use: Power factor problems are reduced . . . excessive power bills resulting from part-load motor inefficiencies are brought in line. Because motors operate at rated output, the need for capacitors to correct power factor is substantially reduced.

Less Installed Horsepower: With motors rated to match normal loads, total installed plant horsepower will be substantially less. Using conventional methods of determining distribution system needs, transformer and switchgear requirements are lower—less costly units can be safely specified.

Motors insulated with Dow Corning Silicones for high service factors are available now from leading motor builders. For more information on what silicone insulated equipment can mean to you, write Dept. 3607.

How do manufacturers build so much extra into a motor? By substituting an insulation system made from Dow Corning Silicones for the Class A insulation system used in standard lines. Only the insulation changes. Frame, electrical steel and copper remains the same. And there's one change on the nameplate.

Service factor rating goes up. On a TEFC motor, for example, service factor goes up from 1.00 with Class A insulation materials to somewhere between 1.25 and 1.50 when silicones are used, depending on manufacture and horsepower rating.

Handling liquid of varying viscosity, this 5 hp, 1.25 service factor motor withstands overloads, including those created by excessive tightening of pump packing glands.

Motors insulated with Dow Corning Silicones give reliable operation in almost any surroundings—regardless of high ambients, moisture, many corrosive atmospheres. And on the basis of capability, high service factor motors generally cost less than conventional motors.

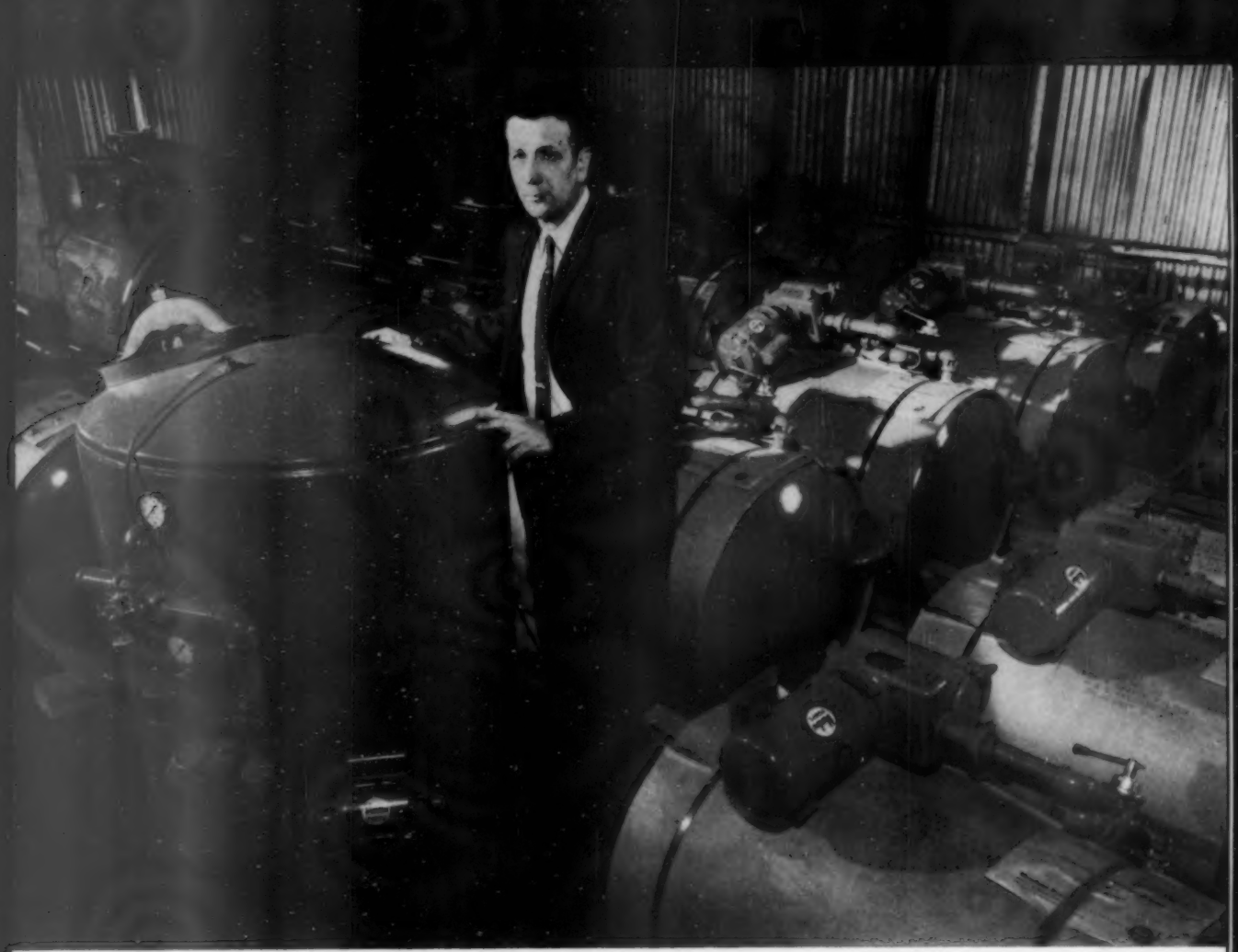
SPECIFY Dow Corning Silicones and SAVE!

first in silicones

Dow Corning CORPORATION
MIDLAND, MICHIGAN

ATLANTA BOSTON CHICAGO CLEVELAND DALLAS LOS ANGELES NEW YORK WASHINGTON, D. C.

For more facts Circle 505 on Reader Service Card



According to Mr. David Greene, of A & G Welding:

"Bitumastic solved our coating problem without delaying our production"

"Part of the reason for the excellent reputation of our swimming pool filters is their long service life," says Mr. Greene, president of A & G Welding and Boiler Co. in South Kearny, N.J. "And protection of the steel interior of these filter tanks against corrosion is an important factor in obtaining this long life," he continues.

A & G tried numerous coatings before selecting Bitumastic® Tank Solution for the job. Some coatings—even more expensive materials—failed due to undercutting; others just took too long to apply and dry, a drawback from the standpoint of maintaining efficient production. Now, tank heads are hand-brushed and the finished, fabricated tank is coated through a port with a specially designed spray gun. The tight, uniform coating film formed by Bitumastic Tank Solution gives long-lasting protection. And, since this coating was specially formulated for potable water applications, it imparts no taste or odor to the pool water processed by the filter.

Just as this Bitumastic coating solved one manufacturer's problem, you will likely find the answer to most corrosion-preventive requirements in one of the ten Bitumastic products. Whether you're coating your plant or your product, Bitumastic coal-tar based protective coatings can help you do it quickly—and less often. Use the coupon for full details. Koppers Company, Inc., Tar Products Division, Pittsburgh 19, Pa. District Offices: Boston, Chicago, Los Angeles, New York, Pittsburgh and Woodward, Ala. In Canada: Koppers Products, Ltd., Toronto.

For more facts Circle 506 on Reader Service Card

SEE OUR CATALOG IN SWEET'S

OR WRITE FOR COPY

KOPPERS

KOPPERS

BITUMASTIC

COATINGS AND ENAMELS

another fine product of COAL TAR

KOPPERS COMPANY, INC.
Tar Products Division
Dept. 135G
Pittsburgh 19, Pa.

Gentlemen:
Please send me more information on the Bitumastic family of protective coatings.

Name _____

Firm _____ Title _____

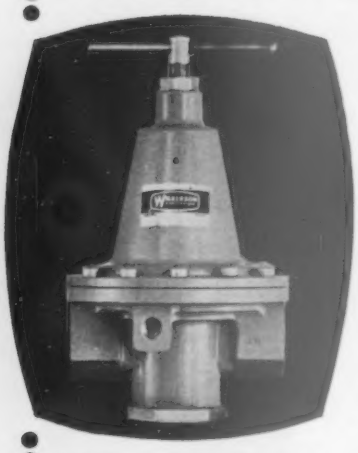
Address _____

City _____ Zone ____ State _____

Reliable accuracy!

Positive performance!

WILKERSON REGULATOR



NEWLY DESIGNED

¾" & 1" sizes

★ **SELF-RELIEVING**

in your choice of direct-operated or pilot-operated models

★ Also available in ¼" to 2" P.T.

★ Rugged Zamak body with Buna N and brass internal parts for long life

★ Non-chattering, balanced valve design

★ Low pressure drop, big ports and valve opening for large flow capacity

★ Larger diaphragm area regulates inlet pressures up to 300 PSI

SEND for #1029a for complete information on

- Remote controls
- Brackets
- Tamper-pruf kits
- Lo & Hi pressure ranges

FREE

New "1st Award" Wilkerson catalog #158 on complete line of air products

WILKERSON CORPORATION

Dedicated to keeping the NEW in pNEUmatics

1634 W. GIRARD, ENGLEWOOD, COLO.

Circle 507 on Reader Service Card

FACTORY CATALOG NEWS

For more about these items, circle numbers on Reader Service Card next to back cover.

ELECTRICAL

1—Induction Motors. Selection, application, and buying guide for Tri-Clad motors—single- and three-phase, ¾ to 150 hp.—is contained in this 14-pager (GEC-1049). Tables of dimensions, performance data. *General Electric Co.*

2—Motor Drives. Bulletin No. V-1 (4 pages) discusses shunt motor drives that receive control signals manually, mechanically, electrically, or electronically. Includes hp. ratings, applications, data tables. *Electronic Controls Inc.*

3—Starters. Here's an 8-page bulletin (No. 8630) with information on full- and reduced-voltage, autotransformer and Wye-Delta starters in 208-4900 volt ratings. Shows starters for air-conditioning applications. *Square D Co.*

4—Load-Center Unit Substations. This informative 32-page bulletin (GEA-3592L) discusses and compares types of load center arrangements. Includes time-current curves, applications, rating tables, etc. *General Electric Co.*

5—Pick-Up Units. Development of sub-miniature pick-ups as monitoring devices for automation and production applications is described in Bulletin 590. Explains how pick-ups are adapted for use with miniature relay control amplifiers. *Photomation, Inc.*

6—Induction Motors. Bulletin PB 6000-9 (8 pages) discusses frame sizes 585 to 589 in Crocker-Wheeler induction series. Range: to 400 hp. in dripproof enclosures and to 350 hp. in enclosed machines. Other data. *Elliott Co.*

7—Capacitors. Brief and simple answers to questions on capacitor applications are given in this 12-pager (B-7642). Discusses power factor, benefits of capacitors, how to select, and other features. *Westinghouse Electric Corp.*

8—Motors. Bulletin 270B (16 pages) is titled "Motor Application Guide." It outlines motor design and characteristics, lists factors in motor selection (including charts), and tells how to use the Guide. *Century Electric Co.*

9—Circuit Breaker Test Units. The importance of circuit breakers and their auxiliary relays to protect electrical distribution systems is the subject of this 16-pager (SB-CB-1). Selection data, etc. *Multi-Amp Electronic Corp.*

PIPES AND VALVES

10—Shut - Off Valves. Bulletin 8100-60 (8 pages) tells about new Series 800 manual re-set valve that shuts off flow of fuel automatically and instantly upon any break in the electric power or safety circuit. *Maxon Premix Burner Co.*

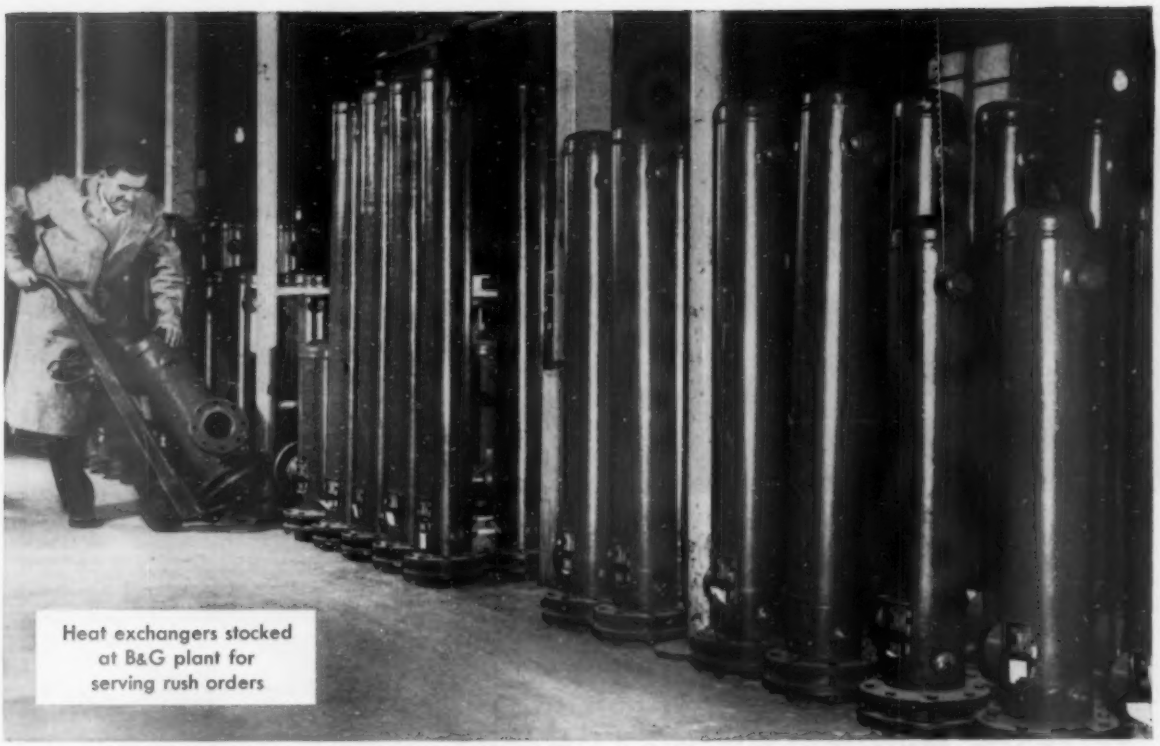
11—Flow Tube. Features and advantages of flow tube for metering process fluids at low or high pressures and temperatures are discussed in 4-pager (Ref. No. 0115.-20-3). Comes in variety of metals and sizes. *B-I-F Industries, Inc.*

12—Solder Joint Valve. This revised 4-page folder presents new No. 2 SJ bronze gate valve, and lists sizes of gate, globe, and check solder joint valves. Cutaway picture shows flow path of fluids through valve body. *Walworth Co.*

13—Tube Fittings. This comprehensive, 118-page spiral-bound catalog of equipment features O-ring seal fittings. Includes specification tables, large drawings that show dimensions of products, and easy-to-use index. *The Lenz Co.*

14—Valves. Catalog FE-138 (28 pages) describes and illustrates liquid relief and special service safety-relief valves. Sizing information, capacity tables, application data arranged for easy selection. *Farris Engineering Corp.*

Turn the page



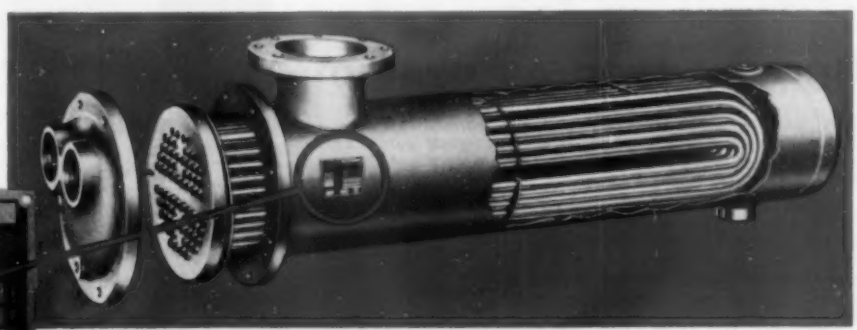
Heat exchangers stocked at B&G plant for serving rush orders

NEED A HEAT EXCHANGER IN A HURRY?

All facilities for heat exchanger manufacture are available under one roof at the B&G plant, where assembly line procedures permit building an inventory of stock parts and complete units. B&G Heat Exchangers are not only engineered to top efficiency but are constructed to the highest standards of quality and safety as required by the A.S.M.E. Unfired Pressure Vessel Code. Form U-1 Manufacturers' Data Report for Unfired Pressure Vessels is furnished with each unit as required by the provisions of the A.S.M.E. Code.

B&G Heat Exchangers are made in both U-bend and straight tube, floating tube sheet models. A comprehensive stock of U-bend exchangers is available for fast shipment. Refrigeration condensers, evaporators, liquid receivers and suction line heat exchangers are also maintained in factory stock.

Send for brochure "The A.S.M.E. Story"



All B&G Heat Exchangers are stamped with A.S.M.E. "U" Symbol

BELL & GOSSETT
COMPANY

Dept. GG-13, Morton Grove, Illinois

Canadian Licensee: S. A. Armstrong, Ltd., 1400 O'Connor Drive, Toronto 16, Ontario

DESIGNED FOR **SPEED** FROM EVERY ANGLE!

★ Quickly adjusts to right size **BEFORE** use.
★ Instantly locks to work with squeeze of **ONE** hand.
★ Instantly unlocks with the **FLICK** of a finger.
★ Fits the **SIMPLEST** and the **MOST AWKWARD** places.
★ **FREES** one hand. ★ Stays adjusted for repeating jobs.

PETERSEN MANUFACTURING COMPANY
DeWitt, Nebraska • Dept. F-7
For more facts Circle 509 on Reader Service Card

Is clean, dry, oil free air

designed into your

Compressed air system?

Only with Adams Aftercoolers and Cyclone Separators can you get virtually **complete** removal of pipeline oil and water vapor — for these reasons:

1. MORE COMPLETE CONDENSATION. Adams Aftercoolers reduce air or gas temperature to within 10° of cooling water. With their efficient counter-flow design, the air passing through the tubes is cooled by 13-pass cooling water over the tube bundle. This cooling achieves maximum condensation of oil and water vapor.

2. MORE COMPLETE SEPARATION OF OIL LADEN CONDENSATE. Adams Cyclone Separators have a unique conical design which produces efficient, 2-stage separation; first, heavier particles in the upper portion; then the finest particles are removed in the inner vortex formed within the conical area. This offers a constant high separation factor over a wide range of volumes—a characteristic not possible with baffle and other type separators.

You pay no more for superior Adams performance because of Adams specialization in these units for over 25 years. They have engineered the extra features into mass-production techniques which keep unit costs down.

New Bulletin 714 merits your attention for fullest possible protection to your air-actuated equipment. Write for your copy today.

R. P. ADAMS CO., INC. • 215 East Park Drive, Buffalo 17, N. Y.

FACTORY / CATALOG NEWS

Begins on page 218

For more about these items, circle item numbers on Reader Service Card next to back cover.

15—Rubber Hose. Applications and other data for 35 types of hose are given in 16-pager (Form 1059). Two charts: one tells "How to Select the Right Coupling"; other lists sizes, weights, ply working pressures, etc. *Mercer Rubber Co.*

AUXILIARY

16—Moisture Control. Catalog No. D8 (16 pages) discusses compressed air dryers for all plant operations. Describes how the Van-Air extracts all water from compressed air, reduces moisture below 0 F. dewpoint. *Van Products Co.*

17—Heavy-Duty Coils. This 44-page bulletin (B1518) describes coils for steam, steam distribution, hot water. Data on condensate rating for both saturated and superheated steam, and coil selection. *American-Standard Industrial Div.*

18—Reactors. Solids-contact reactors for water clarifying and softening are covered in revised 20-pager (5001-C). Explains the principle of radial horizontal rather than upflow as aid to settling of fine precipitates. *Cochrane Corp.*

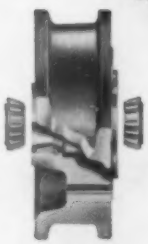
19—Gas Burners. New Junior "Fan-Air" burners for small conversion jobs are presented in revised Bulletin G-100-B (4 pages). Capacities range from 100,000 to 3,600,000 Btu./hr. Dimensions, other details. *The Mettler Co., Inc.*

20—Exhaust Purifiers. "For Cleaner, Safter Air" (4 pages) describes characteristics and elimination data for three catalytic purifiers. Applications: fork trucks, power sweepers, etc. *Oxy-Catalyst, Inc.*

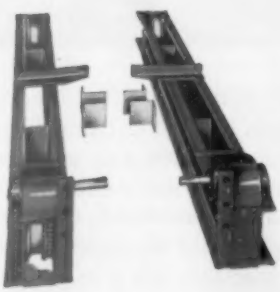
21—Fans. Bulletin IF-100 has 17 pages of engineering data on fans for exhausting, blowing, and drying. Lists air volume tables, corrosion details, drying temperatures, piping information. Photos of new fans. *General Blower Co.*

Turn the page

It Costs Far Less to Build a Crane Locally from Wright Matched Components!



TREAD WHEELS
Made of special car wheel iron with the tread deep chilled to a hardness of 450-500 Brinell. Tapered tread is self-aligning.



END TRUCKS
Welded steel channel construction with heavy steel plate diaphragms. Squaring shaft of ground and polished steel.

CRANE DRIVE UNIT
Consists of electric motor and well-proportioned gear reduction. Solenoid "drag" brake. Size 1—motors up to 2 HP. Size 2—3 or 5 HP motor.

• Now, buy a dependable WRIGHT B-514 Top Running Single Bridge Crane the modern, money-saving way! Here's all you do! Instead of paying shipping costs on a complete crane, order only the matched components—from your nearby WRIGHT distributor. Then, buy heavy I-beam structurals from a local source. This way you realize big savings by greatly reducing freight charges. WRIGHT furnishes an information sheet showing structural components which can be bought locally to complete the assembly.

A FEW OF THE WRIGHT B-514 FEATURES:

Controls • Single-speed push button controls are furnished with fluid-drive models, variable-speed push button controls with models without fluid drive. Variable speed controls have five selective speeds for speeding and slowing crane travel.

Fully Integrated Electrical Controls for the B-514 assembled locally with a WRIGHT Hoist and WRIGHT Crane Drive Unit are factory-installed at no extra charge.

Two Timken Roller Bearings to each wheel. Placed in opposition to one another, they compensate for radial and thrust loads.

GET IN TOUCH WITH YOUR WRIGHT DISTRIBUTOR

If you do not have his name, please write our YORK, PA., office and we will send it to you.

In Canada: UPTON, BRADEEN & JAMES LTD., Montreal, Ottawa, Toronto, Hamilton, Windsor, Winnipeg, Vancouver

WRIGHT CRANES

Wright Hoist Division • American Chain & Cable Company, Inc.

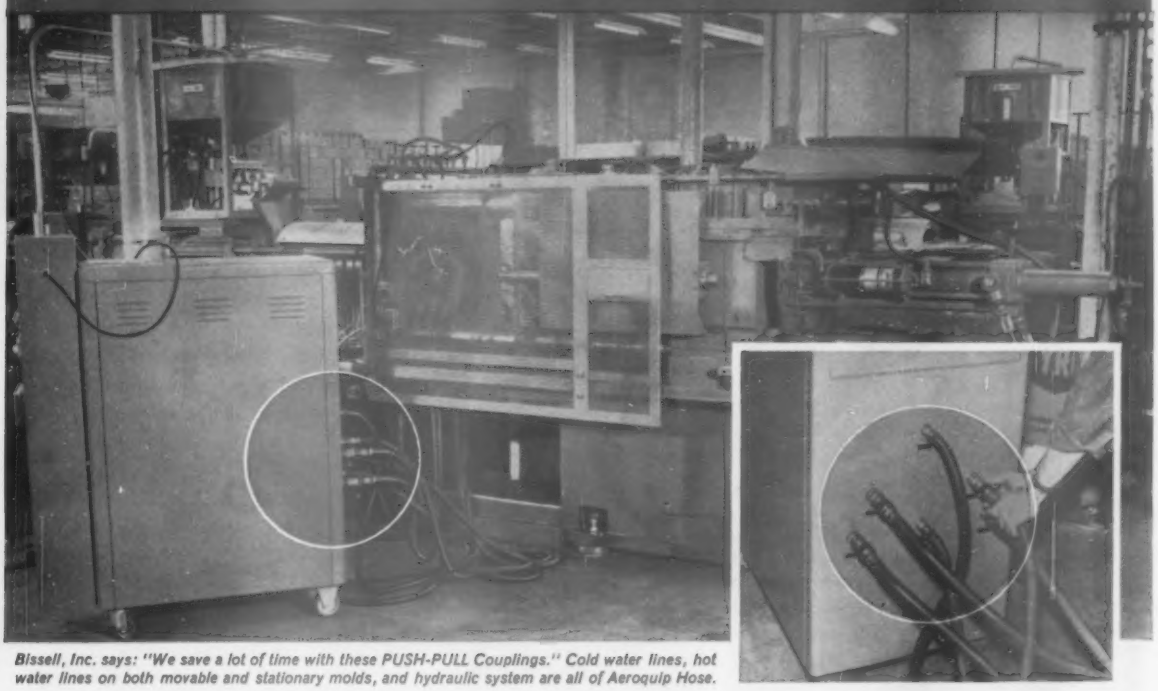
York, Pa., Atlanta, Chicago, Denver, Detroit, Houston, Los Angeles, New York, Philadelphia, Pittsburgh, San Francisco, Bridgeport, Conn.

ACCO

Aeroquip PUSH-PULL Couplings...

"I wouldn't trade them for anything else..."

reports Jack Lindhout, Plastics Foreman, Bissell, Inc., Grand Rapids, Mich.



Bissell, Inc. says: "We save a lot of time with these PUSH-PULL Couplings." Cold water lines, hot water lines on both movable and stationary molds, and hydraulic system are all of Aeroquip Hose.

You've an unbeatable combination in Aeroquip Flexible Hose, Fittings, and PUSH-PULL Self-Sealing Couplings, according to results reported at Bissell, Inc. This combination helps keep plastic molding equipment producing without costly machine downtime, even though high temperatures, pressures and constant flexing are always present.

If you are looking for ways to reduce downtime, and save on hose costs, too, rely on Aeroquip Flexible Hose and Reusable Fittings. And where lines must be connected and disconnected quickly, use Aeroquip PUSH-PULL Couplings. They handle pressures to 3000 psi, and allow only negligible fluid loss on disconnection.

Let us prove you are in good hands when you consult with Aeroquip. Your Aeroquip Distributor, a fluid line specialist, will give you our Catalog 204. He'll discuss specific Aeroquip applications and the benefits available to you. His number is in the "Yellow Pages" under "Hose."

PUSH-PULL Is an Aeroquip Trademark

Aeroquip is so easy to use—Your inventory is just a few feet of hose and a handful of fittings.

STANDARDIZE ON Aeroquip

Reg. Trademark

AEROQUIP CORPORATION, JACKSON, MICHIGAN

INDUSTRIAL DIVISION, VAN WERT, OHIO • WESTERN DIVISION, BURBANK, CALIFORNIA
AEROQUIP (CANADA) LTD., TORONTO 19, ONTARIO

AEROQUIP PRODUCTS ARE FULLY PROTECTED BY PATENTS IN CANADA, U.S.A., AND ABROAD

For more facts Circle 512 on Reader Service Card

For more about these items, circle item numbers on Reader Service Card next to back cover.

22—Steam/Water Controls. "An Engineer's Manual on Steam and Water Service" has 46 pages on the selection of automatic heating and cooling controls. Applications: hot water, fuel oil heaters, and the like. *The Powers Regulator Co.*

23—Sewage Treatment. Bulletin 315-6A1 describes in 6 pages a circular scraper sludge collector. It's the first in a new line of scraper and skimmer mechanisms for sewer treatment plants. Shows collector, drive assembly. *Chain Belt Co.*

24—Pumps. New variable capacity rotary pumps are discussed in 8-page Bulletin No. 600. One of these, the Vari-Flo, makes it possible to "dial" any flow rate from zero to full capacity without changing pump speed. *Blackmer Pump Co.*

INSTRUMENTS AND CONTROLS

25—Telemeters. Principles of operation and other data are given in comprehensive 52-page bulletin (M1715). Applications illustrated include gas distribution and transmission, oil transmission, water distribution. *The Bristol Co.*

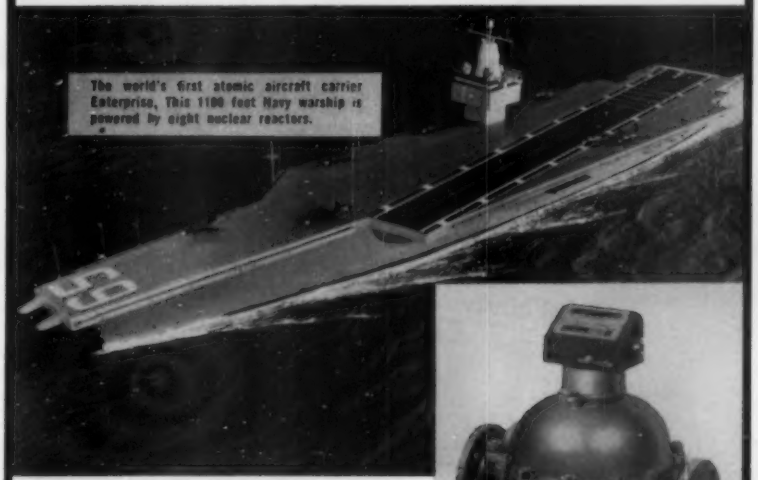
26—Balancing Machines. Bulletin 60 (20 pages) discusses nature, causes, and correction of unbalance, and describes four balancing methods—compensator, nodal bar, pivoted cradle, electrical network. *Tinius Olsen Testing Machine Co.*

27—Control Systems. Electro-mechanical systems and components are covered in detail in Bulletin EE-1008 (6 pages). Contains helpful data if you're in need of automatic controls to convert your present equipment. Shows set-ups of systems. *Seneca Falls Machine Co.*

28—Temperature Controls. Bulletin 108 explains in 12 pages operation, circuitry, and safety features of three basic types of thermocouple-

NIAGARA METERS

Meet the Exacting Requirements of Nuclear-Powered Ships



STANDARD NIAGARA METERS MEASURE DEMINERALIZED COOLING WATER WITHOUT DANGER OF CONTAMINATION

To reduce radioactive contamination in U.S. nuclear-powered ships, the cooling water for the nuclear reactor is demineralized. After demineralizing, the pure water must be measured. The meter selected for this operation must not recontaminate the water and make it a potential carrier of radioactivity.

Niagara Chemical Meters with stainless steel casings were selected. These are standard meters, the same as offered to the chemical industry for metering corrosive liquids. They met the critical Navy requirements without change, to meter and maintain the purity of the cooling water.

The complete line of Niagara Meters is described and illustrated in Bulletin 43. Send for your free copy.

Niagara Stainless Steel Meter. The same as used on the Enterprise. Used industrially for accurately measuring corrosive liquids.

Niagara Electricontact Meter. Brings automation to liquid measuring. Controls, activates, signals. Reduces costs.

Niagara High Pressure Meter. Extra heavy, for measuring liquids at high pressure.

BUFFALO METER COMPANY
INCORPORATED
Subsidiary of American Meter Company, Inc.
2887 Main Street • • Buffalo 14, New York

INDUSTRY WANTS

Minimum-Interruption Maintenance

To meet the definite and ever-changing needs of Industry for protective coatings, Wilbur & Williams has pioneered in the formulation of specialized maintenance products that are easy to apply, fast drying, durable and economical. Their success is best proven by the completeness of their line and the popularity of W & W products among industries with difficult maintenance problems.

TILE-COTE Activated Epoxy Coating — the PRACTICAL Epoxy. Easy to mix, applies by brush, spray or roller. 8 - 36 hour "POT LIFE", unlimited storage life of resin and activator.

An ADVANCED COATING from

THE WILBUR & WILLIAMS CO., INC.

Factory and General Offices, 651 Pleasant St., Norwood, Mass.

In Canada, **WILBUR & WILLIAMS,** 7920 16th Ave., Ville St. Michel, Montreal 38, P.Q.

For more facts Circle 514 on Reader Service Card

actuated Simplytrols. Other types: manual re-set and automatic on-off. *Assembly Products, Inc.*

29—Testing Instruments. Specifications and application information on portable potentiometers, galvanometers, a-c and d-c null detectors, and other instruments are presented in 16-page folder (E(6)). Photos. *Leeds & Northrup Co.*

PRODUCTION

30—Milling Equipment. Bulletin VM-60-C (6 pages) tells about three sizes of portable precision tools for milling, drilling, slotting, boring, shaping, and grinding. Describes design features and accessories. *The Dumore Co.*

31—Carbon Arc Welding. Here's a pocket-size 16-pager (MO-1), "Twin Electrode Carbon Arc Welding Torch Manual." Includes instructions for use of torch, recommended amperage per electrode diameter, applications. *Arcair Co.*

32—Broaching Tools. High-speed steel and carbide broaches for holes, splines, irregular and flat surfaces, keyways are discussed in illustrated 12-pager (B60-4). Covers production of high-speed gears. *National Broach & Machine Co.*

33—Tools. From 68 illustrated pages that show drills, drill sets, reamers, end mills you should find the right tool for any application. Catalog No. 60 has helpful drill facts with diagram, drill speeds and feeds. *Chicago-Latrobe.*

34—Hardsurfacing. Bulletin 3100.1 (12 pages) is a manual with information about hardsurfacing. Analyzes conditions that demand surfacing, and gives details about electrode selection and procedures. *The Lincoln Electric Co.*

35—Welders, Rectifiers. Two 12-pagers: No. WL-4-60 presents d-c, a-c, and d-c/a-c welders in pedestal,

THERE'S A REAL DIFFERENCE IN SAFETY-SWITCH SAFETY!

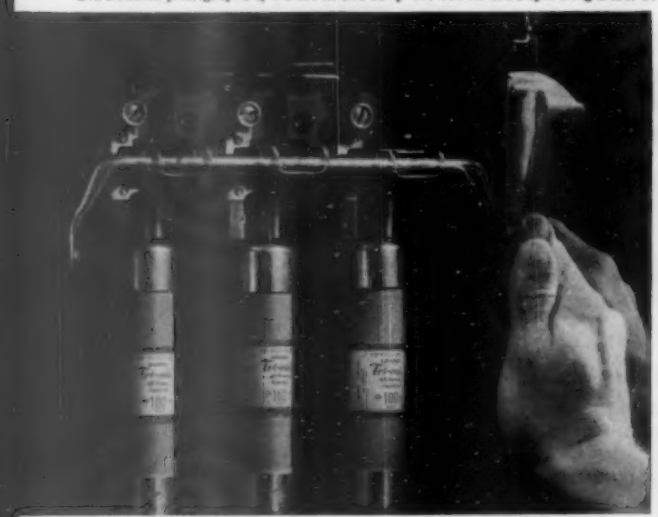
The *real* difference in safety . . . and the difference is *very* real . . . lies in switch performance under electrical load. You can spot this difference instantly when you compare the action of BullDog Vacu-Break® Safety Switches.

When you operate Vacu-Break Safety Switches under load, there is no blinding flash, no dangerous arc "explosion". The exclusive Vacu-Break design double-breaks the circuit, confines the arc within the enclosed switch head, smothers and extinguishes it instantly. Maintenance of contact points is virtually eliminated, and *you don't have to open the switch-box door to know the contact is broken.*

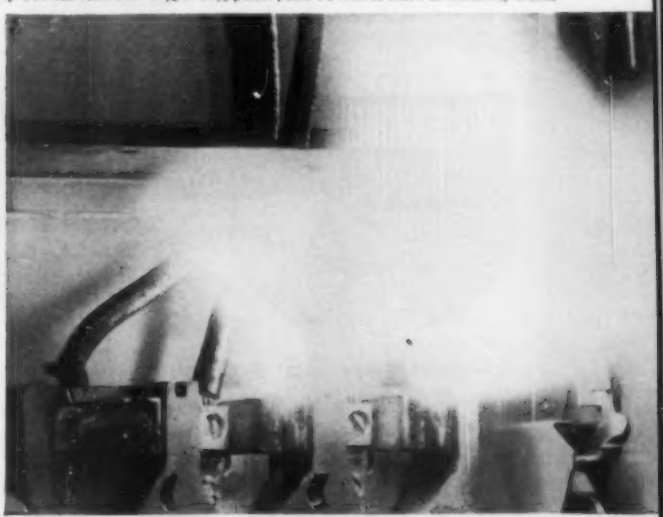
The operating handle is connected directly to the Vacu-Break heads. Push the handle "Off" and contact is broken positively every time. There are no toggles, triggers or springs to depend on. You know the switch is "Off" without looking.

Clampmatic® assembly gives clamped pressure contact, speeds "break". This means positive, safe operation, and long, trouble-free switch life. In safety switches, the *real* difference in safety lies in design and performance. Compare BullDog Vacu-Break Safety Switches with other types, and then *see* the difference!

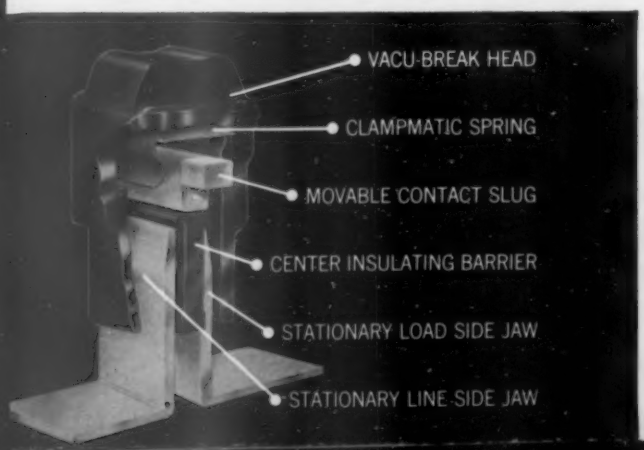
Unretouched photographs of the arc in 100-Amp 600-volt switches operating under 90-Amp 440-volt load with 40% to 50% power factor. Pictures taken at instant of break.



Vacu-Break Safety Switches confine dangerous, destructive arcs inside arc chambers, and smother them instantly.



Open knifeblade switches permit arc "explosions", burning and pitting contact points. The result—fire hazard and switch damage.



Cutaway of Vacu-Break switch head, showing movable contact slug inside arc-smothering closed chamber. Clampmatic spring assembly gives bolt-tight contact, speeds "break", increases switch life.

BullDog Electric Products Division, I-T-E Circuit Breaker Company, Box 177, Detroit 32, Michigan. In Canada: 80 Clayson Rd., Toronto, Ont. Export Division: 13 East 40th St., New York 16, N.Y.

For Safety's Sake—Buy Vacu-Break

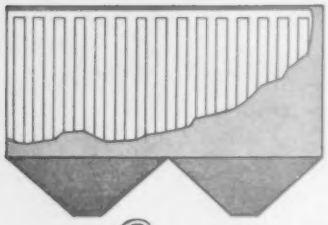
BULLDOG ELECTRIC PRODUCTS DIVISION
I-T-E CIRCUIT BREAKER COMPANY

®

For more facts Circle 515 on Reader Service Card

SINCE 1870 SLY

SLY DUST FILTERS For FULL-TIME OPERATION

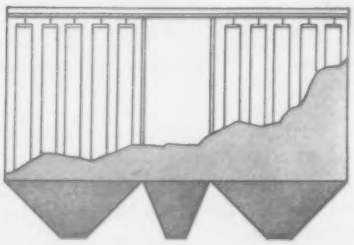


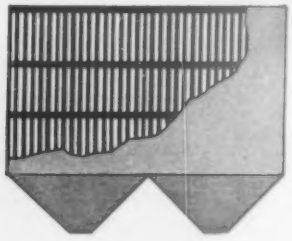
1900's SLY INTERMITTENT DUST ARRESTER

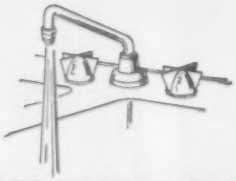
Required complete shut-down periodically for filter bag cleaning.

1930's SLY AUTOMATIC CONTINUOUS TUBE-TYPE FILTER

Sections had to be shut-down alternately for cleaning. Varying suction resulted in incomplete collection.







TODAY NEW SLY "ROLL-CLEAN" DYNACLONE®

Provides uniform suction at dust sources to collect all the dust.

Continuous Dust Suppression Through Constant Suction

The Dynaclone operates continuously, 24 hours a day if required. There is no fluctuation in air volume. This means complete dust collection.

The Dynaclone keeps itself clean automatically. Resilient rubber rolls form a positive seal as each row of bags is cleaned by atmospheric air. A single exhaust fan provides *both* suction for dust collection and air for cleaning. No auxiliary blowers required.

The Dynaclone provides 20 to 40% more cloth in a given space than any other dust filter. Space saved means lower installation costs, simplified piping and ductwork.

New "Resist-O-Wear" filter bags offer 2 to 3 times more bag life. And any bag can be changed without disturbing any other.

More than 40,000 Sly Dust Filters in operation, including over 1,000 Dynaclones. Get complete details . . .

SEND FOR 36-PAGE CATALOG 104

THE W. W. SLY MANUFACTURING CO.

4755 Train Avenue • Cleveland 1, Ohio • Offices in Principal Cities • Overseas Licensee: Andrew Air Conditioning Ltd., London S. W. 1, England

FACTORY / CATALOG NEWS

Begins on page 218

For more about these items, circle item numbers on Reader Service Card next to back cover.

portable, other styles, accessories: SR-160 covers selenium reactifiers for welding machines. *Miller Electric Mfg. Co., Inc.*

36—Serva-Levl Mount. "How to Maintain Absolute Level for Precision Applications" is a 4-pager (60-05). Explains pneumatic servo system that operates as a non-deflective device to maintain absolute height. *Barry Controls Inc.*

37—Collapsible Taps. Design features of detachable heads, rotary models, and long-life tap chasers are described and illustrated in Bulletin G-94-2. These 8 pages include photos and cutaway drawings. *Landis Machine Co.*

38—Welding Equipment. Manual and automatic welding equipment is subject of Catalog 2350 (20 pages). New items include manual gun for use where carbon dioxide is a shielding gas, and two machine heads. *Air Reduction Sales Co.*

39—Arc Welding. This "Vest-Pocket Guide to Better Welds" (EW-213) contains 80 pages of welding data. Gives essentials for proper procedures, examples of welds, welding metals, symbols, cost-saving hints. Photos. *Hobart Bros. Co.*

MAINTENANCE

40—Dust Collectors. Bulletin 1928 (6 pages) describes new Series 345 collectors, tells advantages for difficult applications involving dust concentrations or moisture conditions. *American-Standard Industrial Div.*

41—Molded Packings. This 12-pager (MP-160) presents V-type, U-Ring, Kup, and Pisto-Ring packings for use on rods and pistons of hydraulic and pneumatic equipment, pumps, etc. *Greene, Tweed & Co.*

42—Markers, Signs. Here's a 4-color, 24-page catalog with information on pipe and electrical markers, safe-

Turn to page 23

For more facts Circle 516 on Reader Service Card

For more facts Circle 517 on Reader Service Card ➤

GENERAL ELECTRIC
Offers a Complete Line of

ADJUSTABLE-SPEED DRIVES

□ *MECHANICAL*
□ *ELECTRIC*
□ *ELECTRONIC*

TO MEET EVERY APPLICATION REQUIREMENT

Horsepower
1/4 to 1250

TIMED OR CURRENT LIMIT
Acceleration or Deceleration

OPERATES FROM AC POWER SOURCE

R. P. M.
2 to 6000

SPEED RANGE
Up to 200:1

SPEED REGULATION
10% to 0.1%

Constant HP
Constant Torque
Or Both

Remote Preset Speed Control

SELECT YOUR DRIVES *from General Electric's Complete Line Shown on the Following Pages*

GENERAL ELECTRIC

GENERAL ELECTRIC *Adjustable-Speed Drives Offer* A Great Opportunity

POLYDYNE® DRIVE

Modern, a-c mechanical drive. ¼–25-hp. Speed range to 10:1. New "Equalizer"‡ provides smooth manual or automatic speed control. Produced by Gear Motor & Transmission Components Dept., Paterson, N. J. Write for Bulletin GEA-6806*.

‡ Pat. Pending.

KINAMATIC® *Speed Variator*

Industry's most versatile electric drive. 1–500-hp. Features Kinamatic motor-generator conversion. Speed range up to 200:1. Precise regulation. Regeneration. Wide variety of power unit, motor and control modifications available. Write for Bulletin GEA-6643*.

THYMOTROL† *SPEED VARIATOR*

High quality electronic drive. ¼–10-hp. Wide speed range. Small, lightweight. General Purpose and High Performance types. Write for Bulletin GEA-7018 and GEA-7019*.

Industry's most complete line of modern packaged drives for every performance level, every price range

General Electric adjustable-speed drives are available for every performance level, every price range to help you boost output, improve quality, increase machine flexibility, reduce installation costs, cut your maintenance budget, add substantial profits to your business.

To make possible these advantages, your General Electric sales engineer is backed by an experienced team of adjustable-speed drive specialists—men who work constantly to help you get more out of your machines.

They offer an unbiased, analytical evaluation of your requirements—recommend the adjustable-speed drive that meets the demands of your application most completely and economically.

GENERAL ELECTRIC

to Modernize for Increased Profits

KINATROL✢
SPEED VARIATOR

Outstanding packaged drive value. Compact, versatile eddy current coupling. 3–100-hp. Stepless speeds 1½:1 to 17:1. 2% speed regulation. For complete information write for Bulletin GEA-6885*.

Parmatic
SPEED VARIATOR

Power amplistat conversion features hermetically sealed silicon rectifiers. 1–200-hp. Speed ranges to 200:1. Lightweight, quiet and vibrationless. Field proven. Write for Bulletin GEA-7012*.

** Write to Section 821-4, General Electric Company, Schenectady 5, New York.*

In Canada, write Canadian General Electric, Peterborough, Ontario.

✢ Trademark of General Electric Company.

RESEARCH

In product research, G.E. invests more than three times the industry average. You benefit from the most modern features in your G-E drive.

ENGINEERING

General Electric industry and application specialists, familiar with your production process, assure proper selection and design of G-E adjustable-speed drives to meet your specific application requirements.

MANUFACTURING

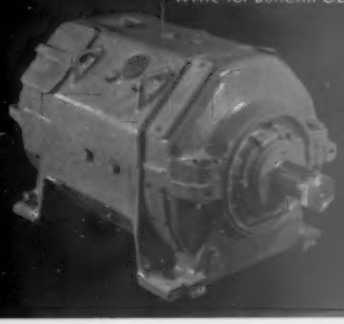
Skilled G-E workers, modern production facilities, standardized components and latest testing methods combine to give you high-quality, adjustable-speed drive equipment, shorter delivery time, lower prices.

SERVICE

G.E.'s service network offers three-way 'round-the-clock' assistance: start-up service, productive maintenance assistance and complete repair service.

MD ARMORED MOTORS

Industry's most preferred d-c mill motor. 500 to 625-hp. Write for Bulletin GEA-4654C*.



KINAMATIC® D-C MOTORS

Most modern, versatile d-c motor for adjustable speed. 1 to 200-hp. Write for Bulletin GEA-6335*.

AMPLIDYNE POWER AMPLIFIERS

Fast response d-c power source with flexible output characteristics. Write for Bulletin GEA-4053B*.

PLUS . . . industry's most complete line of drive components for both general purpose and special industry application

To learn more about the modern capabilities of G-E packaged drives and components, call your nearby General Electric sales engineer. ADJUSTABLE SPEED, a new booklet which outlines G.E.'s complete line of modern packaged adjustable-speed drives, is also available to help you modernize for profits. Ask for Bulletin GEA-6999*.

**** Write to Section 821-4, General Electric Co., Schenectady 5, N. Y. In Canada, write Canadian General Electric, Peterborough, Ontario.***

DIRECT CURRENT MOTOR & GENERATOR DEPARTMENT

GENERAL ELECTRIC

ERIE, PENNSYLVANIA

HEAVY DUTY M-G SETS

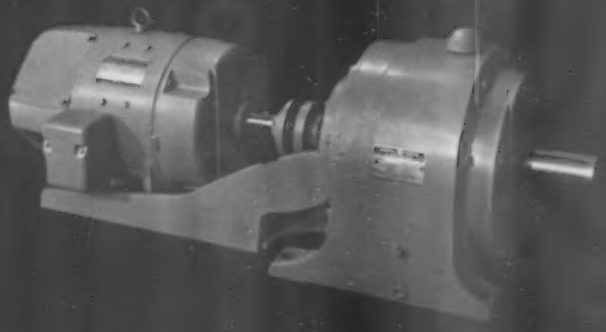
Reliable power conversion for main, auxiliary and process line drives

CD-1000 D-C MOTORS

Performance proved. Quality designed. 250 to 1250-hp. Write for Bulletin GEA-5497A*.

ALL-MOTOR GEAR-MOTOR

A-c or d-c. 1 to 75-hp. Simplified maintenance. Produced by Gear Motor & Transmission Components Dept. Write for Bulletin GEA-6704*.



For more about these items, circle item numbers on Reader Service Card next to back cover.

ty and identification signs, numerals, and letters. All are printed on waterproof vinyl cloth, adhesive-backed. *North Shore Nameplate Div., Anodyne, Inc.*

43—Vacuum Cleaning Systems. Advantages of vacuum cleaning that removes dust (rather than pushes it around) are listed in 8-pager (AVS-400). Illustrates separators, exhauster, discharge valves, other parts. *U. S. Hoffman Machinery Corp.*

MATERIAL HANDLING

44—Lift Trucks. This "Operator's Guide" is a pocket-size manual (G-2, Rev. 2, 36 pages) with information on lift-truck equipment. Includes loading, stacking and safety tips, and new lift accessory data. *Towmotor Corp.*

45—Fork Truck. Advantages of 2500-lb capacity, battery-powered fork truck are described in Bulletin SS-2215 (6 pages). Truck has fork heights to 130 in. for high tiering. Dimensional and other data, photos. *Clark Equipment Co.*

46—Storage Equipment. Bulletin DC-60 (8 pages) discusses angle, T-line, and service truck shelving; steel lockers and cabinets; wire basket storage units. Covers design and construction; tables give dimensions. *Alan Wood Steel Co.*

47—Printweigh Scales. Here's a 4-pager (Form 2023) that shows uses of these scales in a number of installations. Lists features of the units and accessories. Illustrates bench, portable, and floor scales. *Toledo Scale Corp.*

48—Power for Trucks. An informative 12-page bulletin (99A) covers power units for material-handling vehicles. Describes compact power package—an engine, generator and control for electrically driven forklift trucks, platforms, and cranes. *The Ready-Power Co.*

Turn the page

LOCATE YOUR NEW SUPPLIERS...

THROUGH THE FACILITIES REGISTER

ASK THE MAN FROM THE NORTHERN PLAINS

to put you in direct contact with the manufacturers whose wide variety of production is available to you. An accurate plant by plant, machine by machine study has been made and electronically tabulated by Northern Natural Gas Company and other natural gas utilities serving the 5 Northern Plains States. Qualified producers are being referred to industry quickly and without obligation.

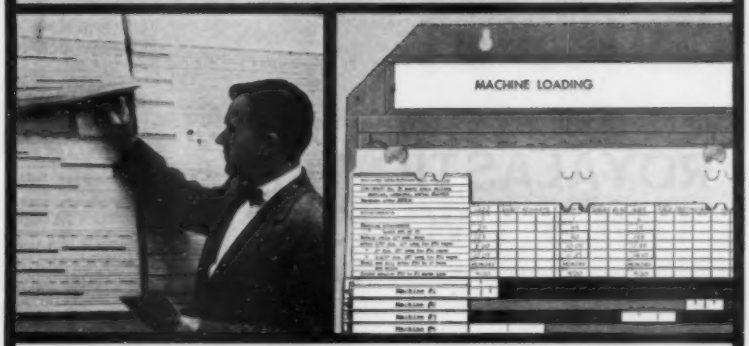
To utilize this service write Randall Klemme, Vice President, Northern Natural Gas Company, Omaha 1, Nebraska, or call Webster 7600.

Serving the Northern Plains
Northern Natural Gas Company
General Offices: Omaha, Nebraska

This Unique Service Is Yours ...Simply For The Asking

For more facts Circle 518 on Reader Service Card

NEW LOW-COST WAY TO RAISE OUTPUT



Acme Visible Planning Panels make it easy to stay on top of your shop

Timing is the essence of high production at low cost. And Acme Visible Panels make it easy for you graphically to plan, schedule and follow through every job. Machine loading. Personnel assignment. Shipping. Data cards in pockets keep essential facts at your fingertips. Visible margins portray your scheduling and work progress at a glance. Send for full facts.

ACME VISIBLE

Acme Visible Records, Inc.,
3107 West Allview Drive, Crozet, Va.

Please send free booklet on production planning and control panels.

NAME_____

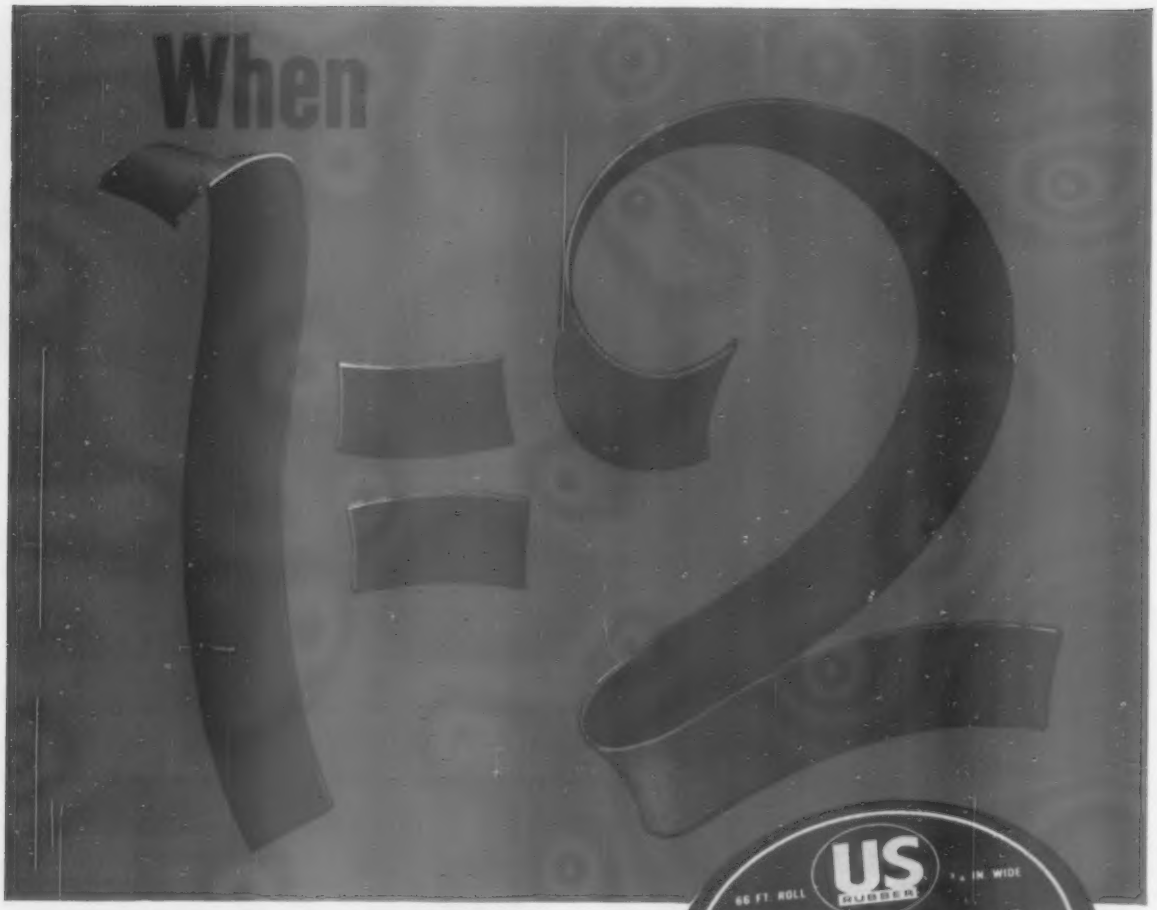
COMPANY_____

ADDRESS_____

CITY_____ STATE_____

For more facts Circle 519 on Reader Service Card

US RUBBER ROYALASTIC TAPE



ROYALASTIC TAPE DOES TWO JOBS

It does the work of both rubber and friction tape.

- Complete mechanical and electrical protection.
- Good tensile strength and high resistance to abrasion and to water, oils, acids, alkalies and corrosive chemicals.
- Good stretch and easy to handle. Makes a neat, thin splice. Approved by Underwriters' Laboratories, Inc.

• • •

When you think of rubber, think of your "U.S." Distributor. He's your best on-the-spot source of technical aid, quick delivery and quality industrial rubber products.

US RUBBER

Mechanical Goods Division

United States Rubber

WORLD'S LARGEST MANUFACTURER OF INDUSTRIAL RUBBER PRODUCTS

Rockefeller Center, New York 20, N.Y. In Canada: Dominion Rubber Company, Ltd.

For more facts Circle 520 on Reader Service Card

FACTORY

FACTORY / CATALOG NEWS

Begins on page 218

For more about these items, circle item numbers on Reader Service Card next to back cover.

49—Coder. This 4-pager tells about a coder and printer that can be used in virtually any position on packaging and material-handling machines. Plastic roller eliminates need for fluid inks or ink fountains. *Thomas Engineering Co.*

50—Wheel Conveyors. Catalog 750-C has 4 pages of description, specifications, and pictures of conveyors with from 6 to 24 wheels per ft., in 12-, 18-, or 24-in. widths. All-steel or lightweight aluminum. *Samuel Olson Mfg. Co., Inc.*

51—Portable Pneumatic Unloader. Here's a 4-pager (126-B) that describes the Portaflow—a standard assembly that can be attached to Airslide cars for dustless, leakproof transfer of dry pulverized materials. *Sprout, Waldron & Co., Inc.*

52—Dock Leveler. How this new automatic leveler operates is explained in 4-pager No. WI-120. Auto-Lip model eliminates need for auxiliary hydraulic or electric power. *The Wayne Pump Co.*

53—Lift Trucks. Two 4-pagers: No. BU481A gives highlights of gas, LP gas and diesel lift trucks in 2000- to 10,000-lb. capacities. BU638 describes safety diesel lift trucks in 3000- to 8000-lb. capacities. *Allis-Chalmers Mfg. Co.*

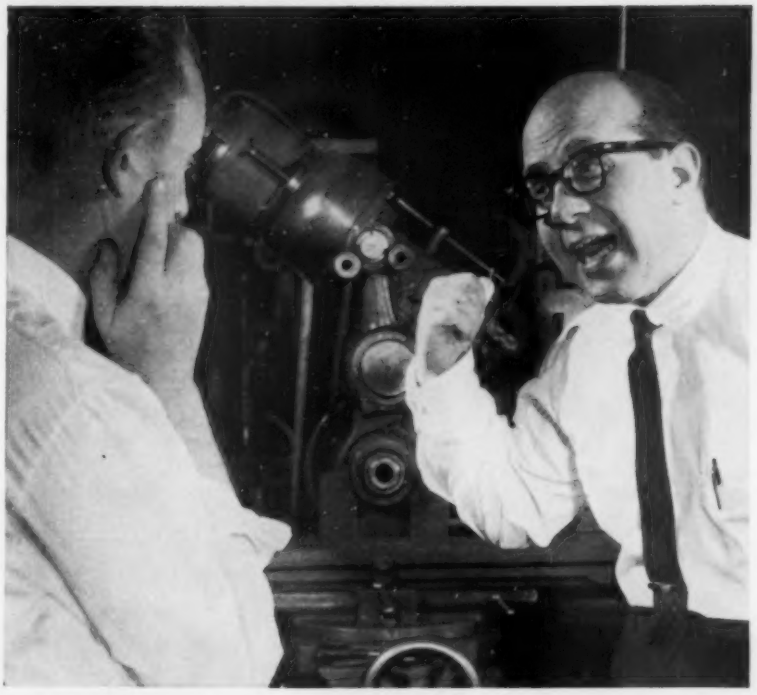
54—Rubber Bumpers. Bulletin H-24 (4 pages) tells about precision-made bumpers for maximum safety absorbing impact. Applications include loading platform protection, dock and truck tail gate fendering, and the like. *Hewitt-Robins Inc.*

BUILDING

55—Partitions. Here's a 4-pager (510D) about Decor partitions and movable walls. They look permanent but can be moved easily. How? A new expandable metal molding clamps paneling into place—and locks it. *Decor Products, Inc.*

Turn the page

TORIT DUST COLLECTION ENDS THIS:

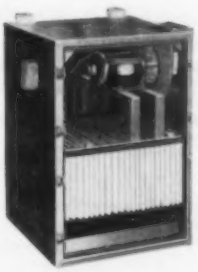


"OUT OF PRODUCTION FOR THREE DAYS? THAT'S WHEN WE'RE SUPPOSED TO SHIP!"

"And believe me, that wasn't all the boss said! Two key machines were so clogged with dirt and grime we had to disassemble and clean them—overnight! Between overtime for the repair crew and our own crew, I managed a partial shipment in three days. And I made up my mind this wasn't going to happen again!

"I'd heard of preventive maintenance with Torit Dust Control equipment—and the Torit representative I called sure opened my eyes! Clean machines hold close tolerances better and up to 80% longer! Torit collectors remove over 99% of dust and air-borne debris, save on both the cost and frequency of servicing.

"I expected there'd be a hitch on prices—but look what I found out: our production breakdown cost nearly as much as the Torit equipment we needed! And just while Torit Dust Collectors are being depreciated we'll make money on them —through maintenance savings, improved production, and reduced down-time!



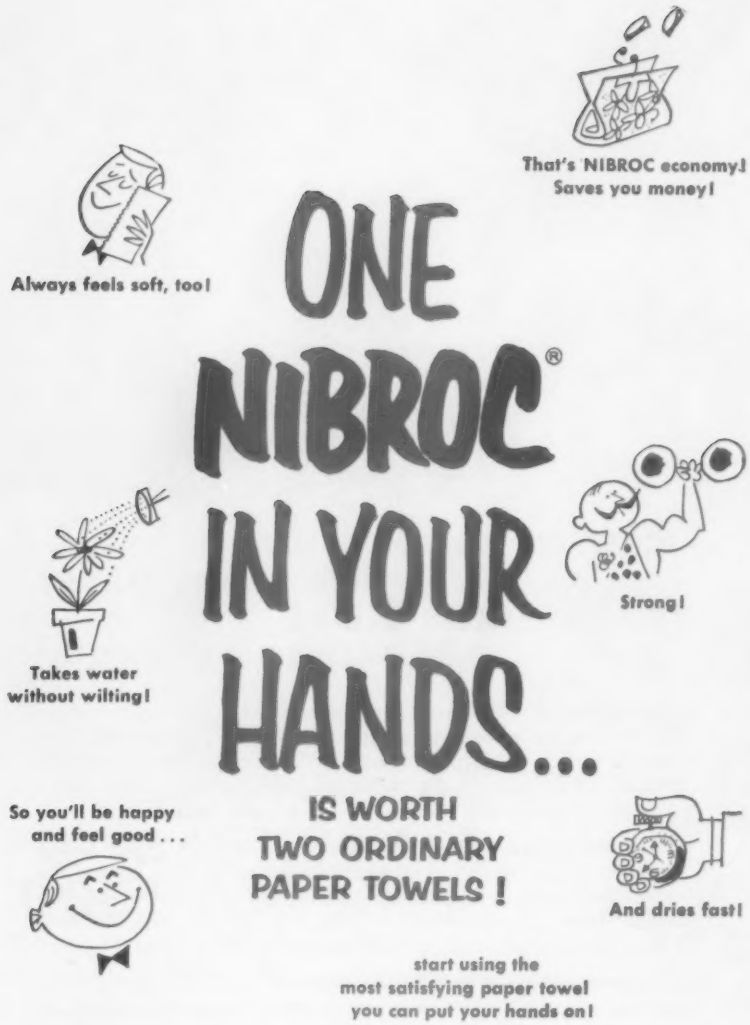
"The boss actually congratulated me when I showed him the savings Torit preventive maintenance gives us!"

Torit Dust Collectors stop dust build-up before it costs you money. They're available in both high efficiency cyclone and cabinet type units. Why not check into them today—write:

TORIT manufacturing company

1133 Rankin Street, St. Paul 16, Minn.. Dept. 320

For more facts Circle 521 on Reader Service Card


That's NIBROC economy! Saves you money!
Always feels soft, too!
ONE NIBROC® IN YOUR HANDS...
Strong!
Takes water without wilting!
So you'll be happy and feel good . . .
IS WORTH TWO ORDINARY PAPER TOWELS !
And dries fast!
start using the most satisfying paper towel you can put your hands on!

Choose from the complete line of NIBROC Quality towels . . . multi-fold, single fold or C-fold in natural, or the super white embossed line—packed in convenient Zip-Top cartons. Write Dept. FO7, Boston, for samples . . . or look under "Paper Towels" in Yellow Pages for name of nearest distributor.

Another Quality Product of BROWN COMPANY

General Sales Offices: 150 Causeway Street, Boston 14, Mass.

FACTORY / CATALOG NEWS

Begins on page 218

For more about these items, circle item numbers on Reader Service Card next to back cover.

56—Locks and Latches. Four series of mortise locks are covered in this illustrated 32-pager. Also describes "new look" screwless trim to match some of the locks, company's new color trim, and miscellaneous locks. *Sargent & Co.*

57—Partitions. How one man, without special tools, can erect a complete system of partitions is shown in new manual (12 pages). Installation directions are clear and each stage is illustrated with simple drawings. *L. A. Darling Co.*

58—Timber Connectors. This 8-pager describes timber connectors, framing devices, installation tools. New products include expanded line of joints and beam hangers. Tables of working loads for grips and clips. *Timber Engineering Co.*

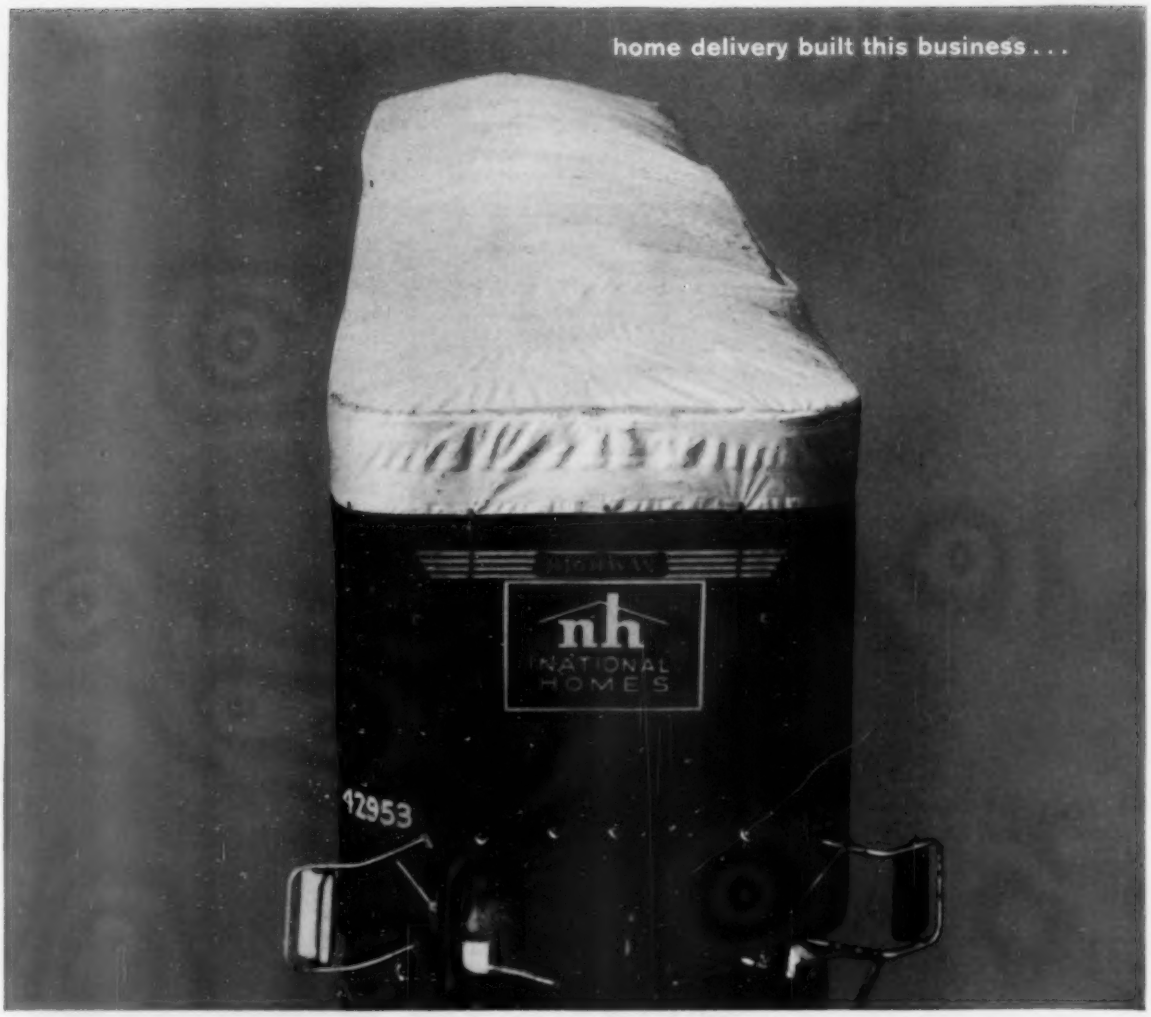
MECHANICAL

59—Fluid Drives. Bulletin A-719 (20 pages) describes maker's Class 4 line of adjustable speed fluid drives. Outlines principles of operation; shows applications, components, dimensions, other data. *American-Standard Industrial Div.*

60—Speed Reducers. This 66-page Bulletin (No. 2824) introduces new fan-cooled worm gear speed reducers in 25 types and over 135 sizes. Lists equipment; selection data includes rating tables of sizes and speeds. Photos. *Link-Belt Co.*

61—V-Belts. Design features and performance advantages of new CX molded V-belts are discussed in 4-pager (M220). Includes specifications for standard and non-standard belt sizes, and selection chart. *Raybestos-Manhattan, Inc.*

62—V-Belt Drives, Hose. Here's a 52-pager (No. 260) with information on V-belts—standard, cog-belt, poly-V, and fractional hp. types, as well as sheaves and hose. Tables list sizes, etc. *Dayton Industrial Products Co.*



This trailer cover, fabricated by Hoosier Tarpaulin & Canvas Goods Co., Inc., Indianapolis, affords top protection against sun and weather.

National Homes ride high and dry under Aluminum Tech-Tarp covers

When National Homes, Inc., world's largest home manufacturer, delivers your new residence, components arrive safe and dry in special open-top vans. (Heavy and irregular sections are lifted from the top.) In transit, the cargo is protected by rugged *Tech-Tarp* nylon covers, processed with a weatherproof compound of Neoprene and ALCOA® Aluminum Pigments by Technical Rubber, Inc., West Haven, Conn.

Explaining his choice of ALCOA Pigments, Technical Rubber's vice president, Raul Carvalho, points to maximum brilliance, outstanding weather resistance and low temperature flexibility. He states that the aluminum coating evidenced no failure during tests at —60° F.

Best temporary protection for most materials and equipment, a good aluminum-impregnated cover like Tech-Tarp: (1) resists sun, salt and chemical attack; (2) does not fade—the silvery sparkle lasts for years; (3) keeps cargos cooler—reflective aluminum pigment turns back heat; (4) does not peel or crack—aluminum is actually part of the material.

ALCOA does not make compounds for aluminum-impregnated fabrics, but we will be happy to see that you get more information about this product. For information about aluminum paints and roof coatings, please send the coupon for our booklets.

For exciting drama watch "Alcoa Presents" every Tuesday, ABC-TV, and "Alcoa Theatre" alternate Mondays, NBC-TV

ALCOA ALUMINUM

PIGMENTS, PASTES AND POWDERS

Aluminum Company of America
1739-G Alcoa Building, Pittsburgh 19, Pa.

Yes, I'd like to know more about aluminum-impregnated fabrics. And please send your booklets, *Painting With Aluminum* and *Aluminum Roof Coatings Make Time Stand Still.*

Name_____

Company_____

Address_____

City_____ Zone____ State_____

MATERIALS NEWS

For more about these items, circle numbers on Reader Service Card next to back cover.

Chemical Stabilizes Plastics

The potential applications of polyethylene and polypropylene plastics have increased with the introduction of a light absorber known as Cyasorb UV 314. Specifically designed to light-stabilize these plastics, the material helps them retain strength and flexibility. Without light stabilization, polyethylene and polypropylene rapidly become stiff and brittle because of their ultraviolet instability.

Typical new applications of the light-stabilized plastics: marine ropes, fabrics used in automotive upholstery and lawn furniture, "mulch" and greenhouse sheeting, tarpaulins, high-altitude balloons, irrigation tubes, and silos. Both clear and pigmented products can be made with the new absorber.

Tests with the new material have shown that, even with absorber concentrations as low as 0.5%, up to 88% elongation is retained after four months' exposure to severe sun conditions in Arizona. After the tests, 90% of the absorber was still present in the plastic. *American Cyanamid Co.* (Circle 195).

Permanent Magnet Alloy Is Easily Formed

A copper-nickel-iron magnet alloy, Cunife, has high ductility and malleability that allow it to be readily stamped, machined, or formed. It is said to be especially useful in applications requiring close-tolerance parts with strong directional magnetic properties. Available as finished magnets fabricated to users' specifications or as wire and strip in a wide range of sizes. *Watkins-Rogers, Inc.* (Circle 196).

197—Interlocking Magnesium Panels take advantage of the metal's non-scuffing, non-galling characteristics. Extruded panels and other interlocking shapes offer high-dimensional stability since magnesium does not wear down the dies when extruded. *White Metal Rolling & Stamping Corp.*

198—Double-Faced Self-Adhesive mounting stock will not creep, adheres to both smooth and porous surfaces. Mactac permanently holds lightweight metal, vinyl and plastic tiles, fabrics, etc., to horizontal or vertical surfaces. Comes in several types. *Morgan Adhesives Co.*

199—Cleaner-Degreaser, called Fabulene, is fireproof, non-toxic, non-fuming. Used full strength or diluted with several parts of water, it is said to afford complete personnel safety in applications where quick evaporation is not required. In liquid form. *The Elgene Co.*

Man-Made Diamonds

These manufactured diamonds are for metal bonded grinding wheels, come in sizes up to 100 mesh for glass grinding, electrolytic and conventional grinding on cemented carbides. Also for cutting synthetic sapphires, germanium, quartz. *General Electric Co.* (Circle 200).

SECURITY GUARD...that's the particular job this Sefton Fibre Can is doing. Protecting brand-name merchandise against counterfeiting. In this case, it's a famous auto part which cannot be replaced by a shoddy substitute. When any product comes in this string-opening package with the seal unbroken, the buyer knows he's getting the genuine article. To **pack it—move it—sell it** is the business of CCA packaging.

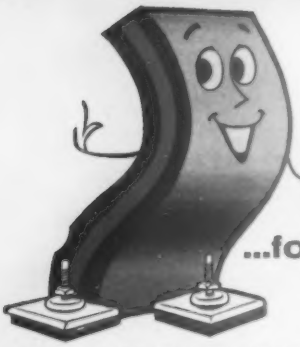
CONTAINER CORPORATION OF AMERICA

Chicago 3... and all key marketing areas

CCA

Folding Cartons, Shipping Containers, Sefton Fibre Cans, Molded Plastic Products, Point-of-Purchase Displays, Paperboard

For more facts Circle 524 on Reader Service Card

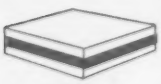


NEW!
UNISORB
"UL" Machine Mount
...for machines with built-in leveling screws

The new model "UL" Unisorb Level-Rite Mount has been developed specially for use under machines with their own leveling screws.

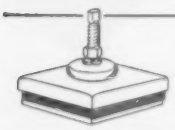
It combines a Unisorb vibration control pad with a cast steel base plate having a recessed center to accept the leveling screw. The Unisorb Level-Rite "UL" eliminates all need for anchor bolts or lag screws, and machines can be moved whenever needed. The Unisorb Pad reduces transmitted vibration up to 85%, allows higher machine speeds, cuts noise and lowers building maintenance.

Unisorb Level-Rite "UL" is available in a range of sizes and loadings, and with high or super density Unisorb — to meet all requirements. Ask about this mount — or any one of the other Unisorb Mounts — from your local distributor or write direct.



Unisorb Mounting Pads
Unisorb pads are the basic vibration control unit, identified by the red centers and brand mark. Available in a wide range of densities and thicknesses for proper application. Saves up to 80% in installation time and costs.

Unisorb Level-Rite 200
Unisorb Level-Rite "Junior" has been especially designed for light machines, air conditioners, business machines and similar equipment. A low cost, precision leveling device and vibration control unit, with loading limit of 200 lbs. per unit. Ideal for original equipment.



Unisorb Level-Rite Mount
Unisorb Level-Rite is a universal, self-contained leveling device for all types of machines. Fast, simplified way to achieve and hold precise level. Available with exclusive screw-post design or as a basic mounting plate for use with built-in leveling devices.

Remember — to simplify installation, improve performance and control vibration . . .
UNISORB MOUNTS MAKE THE DIFFERENCE
. . . for all types of machines from laboratory equipment to giant presses.
Ask for a Money-Back Trial . . . Now!

UNISORB

UNISORB 206 SOUTH STREET, BOSTON 11, MASSACHUSETTS
Division of The FELTERS Company
Sales Offices in New York, N.Y. • Chicago, Ill. • Detroit, Mich. • Upper Darby, Penna. • St. Louis, Mo.
Taylor Felt & Supply Co., San Francisco, Calif. • Acorn Mfg. Co., Los Angeles, Calif.

Please send me a Unisorb Sample and Free Book.

Name.....
Company.....
Address.....
City.....Zone.....State.....
FE 0-1

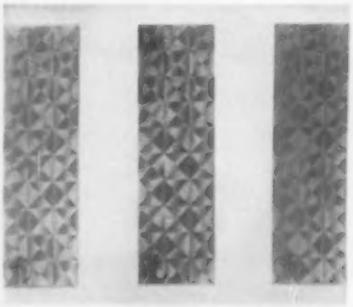
FACTORY / MATERIALS NEWS

Begins on page 236

For more about these items, circle item numbers on Reader Service Card next to back cover.

201—Water-Soluble Polymers, in non-ionic, anionic, or cationic variations, are called Ceron. These etherified polymeric carbohydrates offer a wide range of physical and mechanical properties for use as adhesives, thickeners, suspending agents. *Hercules Powder Co.*

202—Damping Compound, when sprayed or trowelled onto metal plate, reduces structurally borne noise and vibration such as that found in air ducts, transformers, vibratory feeders, etc. Said to render metal plate acoustically equivalent to a sheet of cork. *The Korfund Co.*

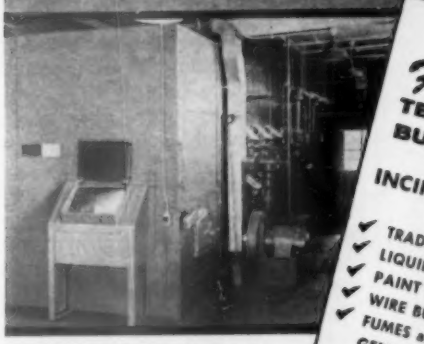


203—Decorative Plate Glass is inscribed with diamond-shaped patterns of vertical and horizontal lines that reflect light in different ways according to angle of view. Thus, light and dark patterns appear to shift; can be printed in colors. *Lancaster Glass Corp.*

204—Two Corrosion Inhibitors, Polychrome 501 for high-temperature recirculating systems and Polychrome 505 for low-temp systems, have an organic additive that interferes with carbonate and phosphate deposit formation. In 5-, 10-, 30-gal. fiber drums. *Dearborn Chemical Co.*

205—Liquid Synthetic Rubber coating for protection of critical surfaces against corrosion, based on DuPont Hypalon resin, is applied by conventional painting methods. Cures to a tough, elastic film resistant to heat, chemicals, and ozone. *The Wilbur and Williams Co.*

For any size factory...
For any waste disposal need...
there's a
JOSEPH GODER
NO-SMOKE NO-ODOR INCINERATOR
providing complete destruction at economical cost



SEND FOR
Free
TECHNICAL BULLETINS
on
INCINERATORS
for
- TRADE WASTES
- LIQUID WASTES
- PAINT SCRAPS
- WIRE BURNING
- FUMES and GENERAL REFUSE

UPJOHN CO., Kalamazoo, Mich., destroys waste solvents in the 1500 lbs./hr. capacity unit. Special forced draft design features auxiliary gas and oil burning.

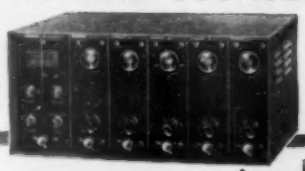
See the Yellow Pages for name of nearest Joseph Goder Representative. Or WRITE

JOSEPH GODER incinerators
4235 N. Honore St., Chicago 13, Ill.
Member: Incinerator Institute of America

For more facts Circle 526 on Reader Service Card

TALLY-COUNT®—*an electronic*
PREDETERMINING COUNTER

Standard 2-decade model:
$245.00



TALLY-COUNT is a versatile instrument, ideal for batch counting, packaging, unit flow and machine cycling. Tally-Count provides electronic speed and accuracy, at a price usually associated with electro-mechanical counters.

Plug-in decades (up to 5) $50 each

unique chassis design for plug-in sensing devices

A wide range of photoelectric and other sensing devices extends Tally-Count versatility. These devices plug into amplifiers, which can be incorporated as integral elements of the chassis. Tally-Count supplies all power for these sensing devices. No other power supply is needed.

Tally-Count operates accurately at speeds up to 100 per second. Batching capacity (5-decade model) is 100,000. Instantaneously resets to zero at desired count. Double and triple pre-set models available.

For full details, write for Brochure NC-7.

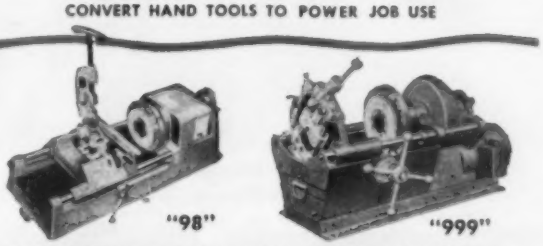
standard INSTRUMENT CORPORATION
657 BROADWAY, NEW YORK 12, N.Y.
In Canada: STANDARD INSTRUMENTS (CANADA) LTD.
767 Warden Ave., Scarborough • Toronto, Ontario

For more facts Circle 527 on Reader Service Card

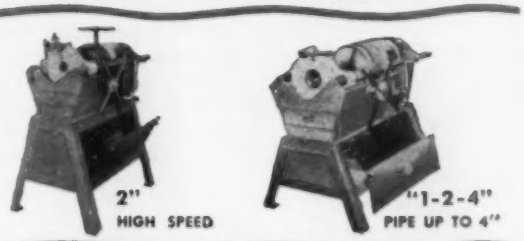
INSIST ON . . .

TOLEDO®
Quality Checked
POWER DRIVES
POWER PIPE MACHINES

PORTABLE POWER DRIVES
"58" "68" "88-A"
CONVERT HAND TOOLS TO POWER JOB USE



"98" "999"
FAST CUTTING, THREADING, REAMING UP TO 2" PIPE SIZES



2" HIGH SPEED
"1-2-4" PIPE UP TO 4"

NEW, Advanced Features

Accurate, Smooth Performance . . . Stamina . . . Long Service Life are the qualities built into the advanced design and engineered mechanical features you get in Toledo Power Drives and Power Pipe Machines. For fast, productive, job-profit operations on up to 2" pipe, bolts up to 1½", make TOLEDO your choice, too!

(SOLD THRU AUTHORIZED "TOLEDO" DISTRIBUTORS)

Write For New Catalog

TOLEDO® *Quality Checked*
PIPE THREADERS • WRENCHES • MACHINES • TUBING TOOLS
THE TOLEDO PIPE THREADING MACHINE CO...TOLEDO 3, OHIO

For more facts Circle 528 on Reader Service Card

No. 41 in a series of washroom survey comments from "SBS soap counselors"

We showed them how "waterless" skin cleanser cuts wash-up costs!

James J. Hosking

is a SBS soap counselor in the Great Lakes area. A specialist in industrial soaps for several years, he has pinpointed economical solutions to skin hygiene and wash-up problems for many plants. Here's a typical example:

"Workers in this Midwestern chemical plant come in daily contact with hard-to-remove, irritating soils — like carbon, caustic soda, salt brine, alkalines, greases, metal filings and cutting oils. Special clothing and gloves offered only partial protection. We found many workmen scrubbing their hands in harmful solvents . . . and making far too many time-consuming trips to the washrooms. I showed management how easily it can discourage the use of injurious solvents and *pick-up lost production time* by putting our SBS 30 Waterless Skin Cleanser at each worker's fingertips. A pleasant cream, SBS 30 cleans without water, quickly and easily removes stubborn, irritating soils . . . puts an end to many costly trips to washrooms."

Money-saving suggestions like this *begin* with OPERATION PINPOINT–a thought-provoking presentation filled with facts about skin hygiene and washroom maintenance. The SBS soap counselor serving your area can pinpoint the right soap to do every skin cleansing job best and at lowest cost in your plant. Let him show you OPERATION PINPOINT . . . just call your nearest SBS office, collect.

the washword of industry

SBS sugar beet products co.

SAGINAW, MICH. • Los Angeles, Calif. • Newark, N.J.
CANADA: Chemical By-Products, Ltd., Toronto, Ontario

FACTORY / MATERIALS NEWS

Begins on page 236

For more about these items, circle item numbers on Reader Service Card next to back cover.

206—Bonding Agent is designed for finish or base-coat gypsum and acoustical or Portland cement plaster bonding to almost any surface. Non-toxic, vermin-proof, and unaffected by the alkalinity of gypsum, lime, or cement mixes. In 1-, 5-, or 55-gal. units. *A. C. Horn Co.*

207—Liquid Flux for brazing and welding, called Cast Iron Liquiflux, allows continuous brazing without painting the metal with powdered flux or dipping the rod in powder. Developed especially for brazing brass to cast iron, cast iron to steel with brass. *Rexarc, Inc.*

208—Foil Ceiling Insulation, Alfol, is for use in plants where no permanent ceiling has yet been installed. Each blanket consists of aluminum foil layers that reflect 97% of all radiant heat and block heat by convection. Needs no maintenance. *Reflectal Corp.*

209—Natural Diamond Grit contains a preponderance of needle-shaped and plate-shaped particles that tend to break off a fraction at a time, allowing platinum carbide crimping die inserts to be ground to a 0.0001-in. tolerance, 1-micro-inch internal finish. *Engelhard Hanovia.*

210—Sound-Absorbing Wall Fabrics are laminations of cotton, rayon, silk, synthetics, woven krafts, or burlaps to vinyl foam up to ¼-in. thick. Can be applied with standard cellulose paste, tacked or stapled to give a multi-cellular sound cushion. *B. F. Ruskin & Co.*

Automatic Has It!

The New 3-IN-1 Tractor

For Faster Order Picking Operations!

TRANSPORTER TRACTOR

MODEL UTE

For 3-Way Operation

Now, remote radio control brings new ease, speed and economy to order picking operations. The order selector can walk, ride or operate his tractor train by remote control. He can remain in one spot, select his orders quickly and efficiently and *then* operate the easy radio control system to move the tractor train *only when necessary.*

Because of its all-transistorized construction, the sturdy transmitter is scarcely larger than a package of cigarettes. It can be clipped to operator's belt, carried, or pocketed. The compact receiver attaches to a protected position on the tractor behind the operator.

The pivoted handle permits the tractor to convert quickly into a walkie for maneuvering in crowded areas. The tractor speed...combined with flexibility of use...enables one UTE Transporter and one operator to quickly and efficiently accomplish his job.

Learn more about the ways the UTE Transporter remote-control Tractor can save you time and money. Mail the coupon below...today!

Remote Control!..

Walkie!..

Rider!

First in Imagination...

First with Reality

AUTOMATIC

AUTOMATIC TRANSPORTATION COMPANY
Division of the Yale & Towne Manufacturing Company
39 West 87th Street, Dept. K-0, Chicago 20, Illinois

AUTOMATIC TRANSPORTATION COMPANY
39 West 87th Street, Department K-0
Chicago 20, Illinois

Please send complete details on the Automatic UTE Remote-Control Transporter Tractor.

*Name*_____

*Firm*_____

*Address*_____

*City & Zone*_____ *State*_____

How FRUEHAUF rolls 'em out stronger, lighter

...with adhesives based on THIOKOL polysulfide polymer

Fruehauf Trailer Company adapts the unique bonding action of polysulfide liquid polymers in a unique way. Polysulfide-base compound is used to join 1-piece roof top to roof bows. Result: roof span is lighter, stronger, and completely weathertight. Rubbery cushion between roof and structural members helps absorb shock of road travel. The use of polysulfide, for the first time, permits bonding of bows and roof sheet for greatly increased structural strength. This is another outstanding example of the industrial applicability of adhesive and sealing compounds properly formulated with THIOKOL polysulfide polymers—and of the benefits that accrue.

For further information about how THIOKOL polysulfide polymers serve industry, and how they may help you—write to THIOKOL on your letterhead.

Polysulfide adhesive applied to structural cross-members by machine.

Cross-members held in place to trailer top sheet by cured sealing compound.

Providing extra seal at roof corners by brushing on polysulfide-base compound.

Skylights also sealed with polysulfide-type sealants as added precaution to guarantee complete weather-tightness.

Thiokol®

CHEMICAL CORPORATION

780 N. Clinton Avenue, Trenton 7, New Jersey

In Canada: Naugatuck Chemicals Division, Dominion Rubber Co., Elmira, Ontario

Not all polymers are polysulfide. When purchasing adhesives or sealants, be sure to specify THIOKOL polysulfide-base sealants. THIOKOL makes only the polysulfide polymer, not the finished product.

®Registered trademark of the Thiokol Chemical Corporation for its liquid polymers, rocket propellants, plasticizers, and other chemical products.

FACTORY / MATERIALS NEWS

Begins on page 236

For more about these items, circle item numbers on Reader Service Card next to back cover.

MATERIALS LITERATURE

211—Laminated Plastics selection guide combines a 12-page manual with a reference chart of characteristics for 21 commonly used laminate grades. Has considerable information; lists common mistakes in specifying. *Taylor Fibre Co.*

212—Alloy Preforms and their design are discussed in this 20-pager. Includes comparisons of preform vs. hand feeding, applications of round wire rings, and description of aluminum brazing preform process. *Lucas-Milhaupt Engineering Co.*

213—Industrial Cleaners are covered in this 8-pager: metal surface polish, liquid degreasers, immersion cleaners, carbon remover, paint solvents. Applications, photos, specifications. *Brulin & Co., Inc.*

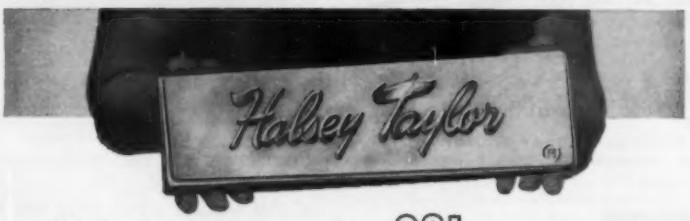
214—Teslar PVF Film is thoroughly discussed in this 30-page technical report. It lists applications; physical, chemical, and electrical properties; surfacing; and availability. Recommends handling practices. *E. I. du Pont de Nemours & Co.*

215—Industrial Proteins from corn products are explained in 40-pager. Zein G-200, an alcohol-soluble protein, and G-210, an aqueous alkali dispersible protein, have uses in pharmaceuticals, paper coatings, etc. *Corn Products Sales Co.*

216—Grease Additives are evaluated in this 12-page lab report with photos and test results. Reported in easy-to-read tabular form, tests covered seven kinds of greases under military and ASTM conditions. *Elco Lubricant Corp.*

217—Filteroid Cores of powdered permalloy are reviewed in a 12-page bulletin that discusses core loss and Q calculation data, inductance variation with temperature, and inductance variation with direct current. *Magnetic Metals Co.*

LOOK BEHIND THIS NAMEPLATE



.. you'll find a background of 231 years' experience

It's almost fifty years ago that our founder, Halsey W. Taylor, pioneered the development of drinking-water equipment with a revolutionary, health-safe mound-building projector. He is still active today. Add his many years of specialized knowledge to that of our key personnel in research, design and engineering . . . and you'll find a combined experience of 231 years!

That's why it pays to look for this nameplate. It distinguishes a fountain or cooler that's Taylor-made . . . a product of ripened experience designed with an eye to tomorrow.

The Halsey W. Taylor Co., Warren, O.

New Wall-Mount

A Halsey Taylor first. Mounts on wall, off the floor. Easily kept clean.

New "All-Climate" Outdoor Wall Fountain

Designed for outdoor use where temperatures drop below freezing. New all-weather features.

The Popular Wall-Tite

No exposed fittings. Fits tight against the wall. Space-saving!

460

ASK FOR LATEST CATALOG, SEE SWEET'S OR THE YELLOW PAGES

For more facts Circle 532 on Reader Service Card

"Slickest visual control..."

states *Factory* magazine. Entries made directly with marking pencil on a rolling "Mylar" sleeve which *moves with time,* bringing deadlines constantly closer. Entries easily erased with the swish of a cloth.

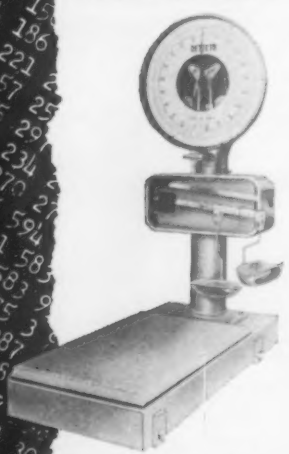
Send for **FREE GUIDE to Control Methods**
with full-scale, sample chart section

Shows how Rol-a-chart controls 22 different items: orders, production, data processing, maintenance, dispatching, sales, etc. Also expert consultation service with no obligation.

Rol-a-chart T.M.

Conley, Baltzer & Steward
494 Jefferson St., San Francisco 9
Circle 533 on Reader Service Card

Count 2,000 2 oz. pieces in less than one minute with a **DETECTO COUNTING SCALE**



Find out how Detecto can streamline your plant operation. Write to . .
DETECTO SCALES, INC., Dept. F-B, 540 Park Ave., Brooklyn 5, N. Y.

244 Circle 534 on Reader Service Card

FACTORY BOOKS

Your Stake Outside the Plant

Once the reader overcomes the "educationese" style of this small anthology, he leaves the jungle of verbal confusion for a clearing of hard-packed, solid information.

Business Responsibility in Action is an edited selection from the proceedings of the 29th National Business Conference held several months ago at Harvard University. More specifically, Editor Dan Fenn, Jr., offers brushed-up versions of situation games played by a score of prominent business leaders. There's also a chapter by Adlai E. Stevenson—former everything, except President—in which he talks about "businessmen who think greatly." This one is good for your soul, if nothing else.

Perhaps the best-edited section of the book is the chapter dealing with the assault by business and government on the smoke-polluted air of Pittsburgh. The fascination of this section arises from the reality of the situation and the way it was attacked. Those of us who doubt that business and government will ever meet will have our images shattered. This one chapter should be required reading in every city hall and business association across the country.

Two other game situations—dealing with management men in politics and the manipulation of overseas operations—are similarly filled with information and provocative comment. They do suffer, however, from poor organization and too lenient editing.

In the light of current (and somehow perpetual) East-West tensions, the chapter dealing with overseas operations is exciting. As with the Pittsburgh chapter, it gains much of its vigor from the recounting of an actual incident. This is a plant location negotiation between Merck Chemical and the government of India. You can't help but feel the mysterious, awesome specter of the Red economic colossus as you read this tale. Also, there's enough information sprinkled through the section to provide good basic training in the philosophy of foreign trade diplomacy.

Summing up: you'll find the rewards grand in this small book, if you build up the patience needed to hike through it. (Reviewed by Lawrence F. Mihlon.)

Business Responsibility in Action, ed. by Dan H. Fenn, Jr., McGraw-Hill Book Co. Inc., 330 W. 42nd St., New York 36. 159 pages. $4.75.

Production Refresher

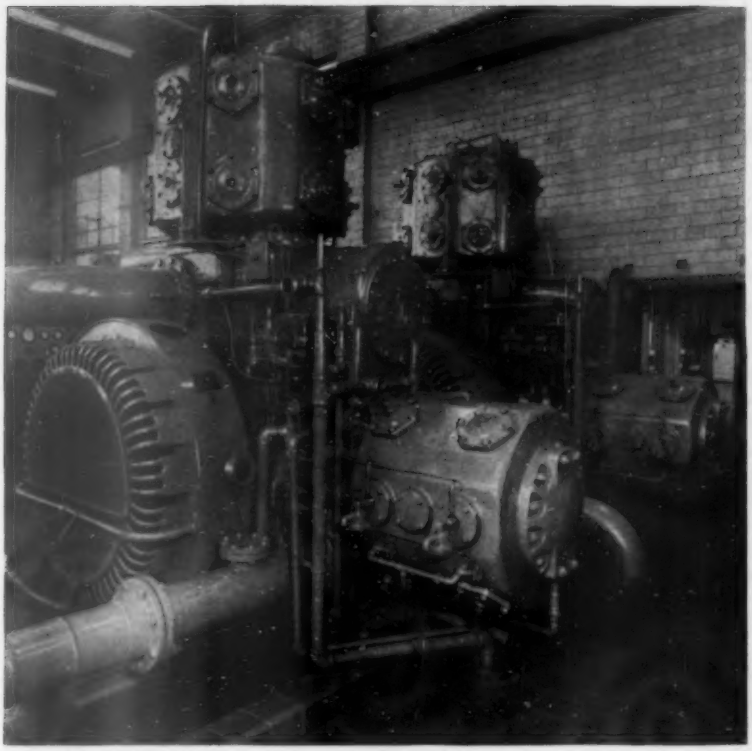
If you want a good review of manufacturing operations—and their management—this book is it. In one neat package Dr. Voris covers the entire field of industrial manufacturing. Although designed for classroom use, *The Management of Production* makes a good addition to any businessman's library.

The author has adopted a helpful, logical format for each chapter, winding up with a succinct summary. One of the outstanding points of the book is its integration of all manufacturing activities. The entire plant is treated as a functioning whole with each operation tied in with the others. Management principles are also emphasized throughout and are illustrated with 30 case histories.

In his analytical approach the author does not forget that successful plant operations are more than processes, procedures, and equipment. He stresses the "people" aspect throughout, in each chapter emphasizing the knowledge required, the status of management, and the opportunities available for individuals who are interested in each operating function.

The book is punctuated with neat, simple definitions that leave little room for misinterpretation. And the author's firm opinions are bound to help you make up your own mind, even though you may not always agree with him.

For those puzzled by the terms currently used to explain "manufacturing," this book will help to



IN I-R COMPRESSORS,

TIME TELLS

THE DIFFERENCE

In these two XLE compressors, 21 Channel Valves have operated

45,482 HOURS

with no parts replaced!

The two Ingersoll-Rand XLE air compressors shown above are installed at a large midwestern automotive plant. They were started up in May, 1951, and at this writing have totalled 45,482 hours, mostly at 16 to 24 hours a day.

Of the 28 Channel Valves (14 per unit), 21 have operated full time with *no repairs*, merely being cleaned once a year. Each of the other seven valves had only one channel and spring replaced in all this time, during the scheduled inspection period. And all the valves are operating with their seat plates still on the first side – when the plates are turned over, their life will be doubled.*

The *extra value* that's built into every type of Ingersoll-Rand compressor pays off with *long-run economy*. Reduced maintenance and attention, over many years, mean long-range savings in the cost of air power. Ask your I-R representative for more information on the world's most complete line of compressors, from 1/2 to 7500 hp. Call him now.

***Only I-R compressors have Channel Valves**
Known for high efficiency, quiet operation and exceptional durability. Entirely different. Each valve is a combination of rigid stainless-steel channels and bowed leaf springs, with trapped-air spaces which cushion action, prevent impact.

Ingersoll-Rand
11A1 11 Broadway, New York 4, N.Y.

The World's Most Comprehensive Compressor Experience

For more facts Circle 535 on Reader Service Card

Specify PANNIER STEEL STAMPS for a longer life of CLEANCUT MARKING

29,335 hammer blows—and still marking cleanly—Pannier Letter and Number Stamps

Rounded corners for finger comfort
Rounded head distributes impact, reduces mushrooming.
Type size Identification
Added metal in Pannier fillet increases durability. Correct bevel gives clearer impression, longer life. Outside bevel longer than inside for protection of character face.

Made of the finest tool steel and correctly heat treated for best combination of hardness and toughness, Pannier single character stamps can take it! Scientific shaping and accurate engraving insure a long life of good, clear impressions. Available in letters, figures and special symbols, and in light, medium or heavy duty design.

Extra tough steel forging stamps for hot or cold, heavy duty marking

For stamping names, part or patent numbers, trade marks and similar markings, Pannier forging stamps are made in four styles:—Hand-style, fullered for wire handle and wood handle style with eye parallel or perpendicular to lettering. All are designed and heat treated for clear impressions and long service. All are covered by the Pannier Master Marker guarantee.

Supreme Holders with "Roto-Pin" for quick, easy number change

An easy, half-turn flip for Roto-Pin releases any or all of the steel type for fast change. A reverse flip locks them in perfect alignment.

Roto-Pin makes this Pannier Master Marker a time saver in number change and makes serial number marking fast and efficient. The hardened anvil at the base of the type slot keeps type in perfect alignment for equal impression. Machined from bar tool stock, the Supreme Holder has a heat treated striking head. Both anvil and striking head are replaceable for longer life of the holder itself. Made in hand or wood handle styles, for hot or cold marking.

Write for literature

BIRTHMARKED MATERIALS

MARKING DEVICES

THE PANNIER CORPORATION

201 PANNIER BUILDING PITTSBURGH 12, PA.

Offices: Los Angeles • Cleveland • Chicago • Philadelphia • Birmingham

PANNIER MASTER MARKERS FOR QUALITY

clarify differences between organization and policies, between types of industries and types of manufacturing, and between research-and-development and product design engineering. (Reviewed by W. A. Bussard.)

The Management of Production, by William Voris. The Ronald Press Co., 15 E. 26th St., New York 10. 450 pages. $6.50.

Industrial Water and Waste Water is a dispassionate report of current problems and methods, as well as scientific testing. The first third of the book (Part One) is a review of industrial water, and the problems of sampling and analysis. Part Two contains the ASTM standards and useful tables. Neatly bound, well indexed, and tastefully illustrated, this book can stand alone as the authoritative working textbook in any industry where water quality and testing is involved.

Manual on Industrial Water and Industrial Waste Water, Second Edition, prepared by ASTM Committee D-19. American Society for Testing Materials, 1916 Race St., Philadelphia 3. 658 pages. $11 (to Members, $8.80).

Accident Prevention Manual is the latest (fourth) edition of this always-reliable reference on industrial safety. Each of the 45 chapters has been revised and updated, and there are new chapters on ionizing radiation and foundry operations. With 200 pages more than the previous edition, this volume is a "must" for anyone in safety work.

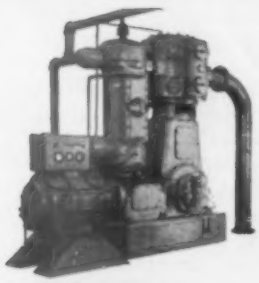
Accident Prevention Manual for Industrial Operations. National Safety Council, 425 N. Michigan Ave., Chicago. 1542 pages. $15.50.

Machinery's Handbook (16th edition) contains a fantastic amount of technical data in its thousands of charts, tables, and formulas. The handbook has been providing answers to machinists' questions for 45 years and this edition is bigger and better than ever.

Machinery's Handbook, by Erik Oberg and Franklin D. Jones. The Industrial Press, 93 Worth St., New York 13. 2104 pages. $11.

Which... ATLAS COPCO COMPRESSOR

meets your needs best?



AR Heavy-Duty Compressors

More air per horsepower than any comparable compressor! For continuous, full-load operation. "L" angle, 2-stage, double acting. Water cooled. Standard models provide 382 to 3210 cfm free-air delivery at 100 psi; only 76-590 hp required! (Can be supplied for other working pressures on request.)

What's your compressor requirement? Need an installation large enough to provide air for all your needs? Or would a small, compact unit for auxiliary operation solve your immediate problem? Either way—and for a wide range of applications between these extremes—Atlas Copco has the compressor for you!

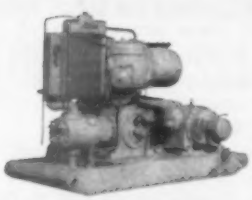
No matter which you choose, you'll get these proven advantages from Atlas Copco:

(1) More air per horsepower—less power consumption than other comparable units!

(2) Really low maintenance (one example—$3.10 after 10,000 hours' operation)!

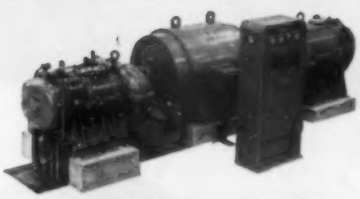
(3) Specifications are guaranteed free-air delivery—you get exactly what you order!

Get all the facts now—and compare! The coupon below will bring you a free catalog. (No obligation, of course.)



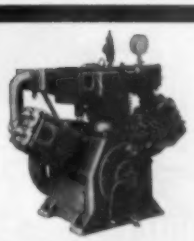
AR-L Heavy-Duty Compressors

Same basic construction as the AR Series, but provided with an air-cooled intercooler and air-cooled radiator for the cylinder water. Fan on compressor flywheel cools radiators. Perfect for arid areas or where difficult to bring in water. Both stationary and skid-mounted models available.



TWIN-AIR Rotary Screw Compressors

Brand new! "Twin-Air" Compressors offer capacities from 6,900 to 19,400 cfm at working pressures up to 115 psi. And, you get completely oil-free delivery of air or gas, since no lubrication is required—timing gears maintain small clearances between precision-mounted rotors, eliminating friction (and the necessity of oil) in compression chamber.



CT Air-Cooled Compressors

Stationary, or skid-mounted compressors for use where air demand is between 50 and 300 cfm. Totally air-cooled. Cylinder arrangement designed for smooth, vibration-free operation. Compact, rugged—for continuous, 24-hour trouble-free service. Highly efficient; low on maintenance costs.

ER-6 Heavy-Duty Compressors

New! Fundamental improvements over conventional heavy-duty compressors reduce power requirements (18.3 hp/100 cfm at 100 psi, full load); provide totally enclosed design; and save on floor space. Capacities to 1,140 cfm; standard instruments and safety devices.

ATLAS COPCO
Dept. F-5, 545 Fifth Avenue,
New York 17, N.Y.

Gentlemen:
Please send me ☐ Short-form catalog ☐ Detailed information on the _____ Series

Name _____ Title _____

Firm _____

Address _____

City _____ Zone _____ State _____

Atlas Copco

610 Industrial Avenue
Paramus, New Jersey
COlfax 1-6800

930 Brittan Avenue
San Carlos, California
LYtell 1-0375

For more facts Circle 537 on Reader Service Card

Physicians and nurses and the patient requiring attention, find Bradley Washfountains with foot-control ideal.

To wash hands, no faucets need be touched or manipulated—a touch of the foot treadle controls water supply from the sprayhead which replaces faucets. Hands are thoroughly washed and as *thoroughly rinsed* without making any contacts. Also, there is never any collection of used water in the generous sized bowl since it is self-rinsing—always clean.

Type D Bradley Washfountains have bowls of stainless steel, or vitreous enameled pressed steel with decorator colors available for bowl and pedestal to harmonize with floor or wall tile colorings.

Our new Bulletin K1204 includes all details. Ask for a copy now . . . BRADLEY WASHFOUNTAIN CO., 2215 W. Michigan St., Milwaukee 1, Wisconsin.

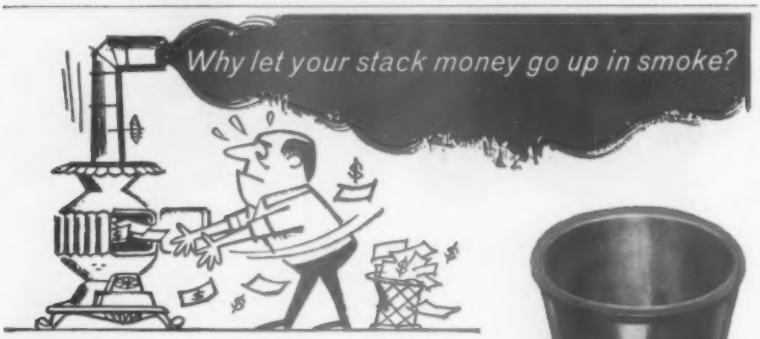
Lift hinged Treadle to wash floor

New Bulletin K1204

Bradley

BRADLEY
FOOT CONTROL
washfountains

For more facts Circle 538 on Reader Service Card



Here's why you're money ahead

with A. O. Smith glass-protected smokestacks

- Now available in a variety of colors
- They last longer — as much as 3 to 5 times longer than unlined steel stacks — corrosion resistant regardless of excess condensate
- Glass is tough, durable — shows remarkable resistance to impact or abrasion
- Maintenance is low! There's no painting—glass can't rust
- Economical to install — no need for special equipment or highly skilled workmen

Write Dept. F-70 for full facts.

Through research . . . a better way

A.O.Smith
CORPORATION

SMOKESTACK SALES
PROCESS EQUIPMENT DIVISION
P. O. Box 584
Milwaukee 1, Wisconsin

FACTORY FILMS

How Good Is a Good Guy? is a training film that deals with one of the most important problems management faces today—the need for effective leadership. The film focuses on supervisors and managers, shows how and when these leaders become ineffective. It analyzes the reasons for failure and shows how the problems could have been handled successfully. 16mm, sound, color or b/w, 21 min. Write to:

Roundtable Productions, 8737 Wilshire Blvd., Beverly Hills, Calif.

Something New—Something Better illustrates 2000-lb. capacity electric-powered fork truck and explains stepless speed control made possible by carbon pile resistor. Dramatizes the fast lift speeds, short turning radius requirements, other features. 35mm, sound, color, 20 min. For loan, write to:

Clark Equipment Co., Industrial Truck Div., Slide Film Dept., Battle Creek, Mich.

Spliced for Life is two films: Print No. 1 covers unshielded cables for use up to 5000 volts; No. 2 depicts shielded variety for higher voltages. Scenes show preparation of cable ends, installation of soldered connectors or compression lugs, build-up of splices. 16mm, color, each 20 min. Write to:

The Okonite Co., PR Dept., Passaic St., Passaic, N. J.

Ideal Transport Story dramatizes the building of a permanent conveyor system that's said to be the longest in the world. Installation is supported by prestressed concrete structures and is made up of seven separate belt conveyors arranged to feed onto each other. 16mm, sound, color, 22 min. Write to:

Link-Belt Co., Dept. PR, Prudential Plaza, Chicago 1, Ill.

This Will Kill You is a filmstrip that demonstrates the safe use of electricity. Such questions as, "How can electricity kill you?" and "What can you do to avoid danger?" are graphically illustrated. 35 mm, color, sound, 30 min. Write to:

Traid Corp., P.O. Box 648, Encino, Calif.

For more facts Circle 539 on Reader Service Card

SCOTCH
BRAND

TAPEnology... industry's newest cost-cutting tool

TAPE BUNDLES "AWKWARD" MATERIALS FOR EASY SHIPPING OR STORING

V-Crimp or corrugated roof and siding material sheets are bundled quickly and easily with "SCOTCH" BRAND Filament Tape. On in seconds—tape conforms to irregular surfaces. Makes nesting or stacking difficult materials easy.

"SCOTCH" Filament Tape sticks at a touch to any clean dry surface. No heavy tools or muscles needed. Won't scratch or mar surfaces. Won't cut employees' hands. No disposal problem . . . strips off easily to allow ready accessibility to single pieces of material if necessary.

"SCOTCH" Filament Tape is super-strong . . . amazingly shock-resistant. Even short strips do the job. Thousands of embedded filaments act like tiny muscles to give up to 500 lbs. of tensile strength per inch of width.

What's your shipping problem? "SCOTCH" BRAND Filament Tape offers dozens of time-saving, labor-saving, and dollar-saving shortcuts. Holding, bundling, carton-reinforcing, unitizing . . . chances are your 3M Representative can show you how to save with "SCOTCH" BRAND. Ask your "SCOTCH" BRAND Tape Distributor for information, or write: 3M Co., 900 Bush Ave., St. Paul 6, Minn.

When tape costs so little, why take less than "SCOTCH" Brand?

"SCOTCH" IS A REGISTERED TRADEMARK OF 3M CO., ST. PAUL 6, MINN. EXPORT: 99 PARK AVE., NEW YORK 16. CANADA: LONDON, ONTARIO.

MINNESOTA MINING AND MANUFACTURING COMPANY
...WHERE RESEARCH IS THE KEY TO TOMORROW

3M COMPANY

SCOTCH BRAND
SCOTCH BRAND
SCOTCH BRAND
SCOTCH BRAND
SCOTCH® BRAND
SCOTCH BRAND

Cadillac Gage gets tight production and labor control...reduces clerical costs by 30% with easy-to-use Automatic Keysort

NEED: fast, accurate management reports for controlling production of ultra-precision units—and a 475-man work force.

COMPANY: West Coast Division, Cadillac Gage, leading manufacturer of electric-hydraulic servo valve assemblies for missiles and aircraft.

SOLUTION: the easy-to-use, low-cost machines and punched cards of Automatic Keysort Data Processing.

METHOD: Keysort punched cards, mechanically code-notched with required information for rapid sorting, are created as original documents for 1) material planning, 2) job-routing and 3) labor distribution. Upon completion of each job, the accounting department automatically processes the collected information with the Keysort Tabulating Punch—internally coding the cards with actual and estimated time of job. This unique machine then automatically produces a tabulation of variance in work time by work center and order number.

RESULT: with the comprehensive, on-time reports made possible by Automatic Keysort, Cadillac Gage is now able to pinpoint any job in the plant . . . can determine the cost of labor and the total time spent on each job by department and individual clock number. Knowing where they stand, management can act *at once* to correct a profit-losing situation. Best of all, it's done without specialized personnel. Without restrictive procedures. And at remarkably low cost.

For a detailed report on Automatic Keysort Data Processing at Cadillac Gage, call your nearby Royal McBee Data Processing Representative, or write Royal McBee Corporation, Data Processing Division, Port Chester, New York for Case History 977.

ROYAL McBEE . *data processing division*

NEW CONCEPTS IN PRACTICAL OFFICE AUTOMATION

For more facts Circle 541 on Reader Service Card

Employee Gift Matching

Another Good Way To Help Our Colleges And Universities

The business community continues to make an impressive record in giving badly needed financial help to our colleges and universities. This year the Council for Financial Aid to Education expects that business contributions to higher education will be well over four times their total of about $40 million a decade ago.

If these contributions, which were about $150 million last year, continue to increase at the present rate, they will hit the target of $500 million set for business aid to our colleges and universities in 1970. This is the amount which, the Council calculates, must come from business if these institutions are to have the money to do their job properly a decade hence.

However, it would be a fine thing both for the nation and the business community if that $500 million dollar target were hit well before 1970. This would put us ahead of a schedule (it is a conservative schedule) in getting on top of what remains one of the nation's most crucial problems—that of having its colleges and universities adequately financed which they are very far from being right now.

There is, we believe, one quite simple way by which financial support for higher education by business firms might be considerably speeded up. All that is required is that business firms generally abandon the idea that it is possible for every company to have a program to provide such support that is novel and distinctive, and that this is the only way that interests of prestige and good public relations can be served.

There are nowhere near enough good plans to provide financial help for higher education to equip even a small percentage of our business firms with one that is novel and distinctive. Also **there are a number of very good plans which, so far as we can tell, lose nothing of their value for prestige and good public relations by being used by a large number of companies.**

The Gift Matching Idea

One plan with these attractive characteristics is the plan by which companies match the gifts of their employees to colleges and universities, and now increasingly gifts to independent secondary schools. So far as we can discover the general plan was invented by the General Electric Company, with what it calls its Corporate Alumnus Program. Now, with variations on the same basic design, almost 100 companies have gift matching plans. We at McGraw-Hill are included in this number.

The gift matching plans vary considerably in detail. Some are limited to alumni of the schools to be benefited. In others any employee can participate by making a gift to an eligible institution. There are also variations in the maximum amounts of gifts by individuals and to individual institutions which will be matched. Some companies have "open end" plans; others limit the total to be matched in any one year. All of the plans, however, embody the same central gift matching idea.

When the plan was first launched some college administrators of little faith in the fundamental generosity of the alumni and friends of their schools expressed the fear that if gifts were to be matched they might be made smaller in the first place. The opposing view was that the possibility of having them matched would stimulate more and larger gifts.

Advantages Of Gift Matching

So far as we have been able to discover, the expectation that giving would be stimulated by gift matching has been validated by the experience with the plans. This has been our experience at McGraw-Hill. Some other important virtues of the gift matching programs have been summarized by

LEADERS OF SOME OF THE INSTITUTIONS WHICH HAVE SHARED IN THE McGRAW-HILL EMPLOYEE GIFT MATCHING PROGRAM EXPRESS THEIR VIEWS

"We particularly appreciate the fact that your grant is unrestricted, and can therefore be used for our area of greatest continuing need — the General Education Fund, from which faculty salaries come."

W. Boyd Alexander, Vice President and Dean of the Faculty
Antioch College

"We are grateful, not only for the financial support given to The Cooper Union by your company, but also for the stimulus it has provided our alumni in your employ to make annual gifts to their Alma Mater."

Edwin S. Burdell, President
The Cooper Union

"The gift matching program has a dual advantage. First, it acknowledges and repays a debt of honor to those colleges which, often at great loss to themselves, have trained and educated the men who are now among your personnel. This is most fair and equitable. Secondly, by offering to match up to a given limit the contributions of alumni, you encourage support of their own colleges on the part of graduates, who themselves are so indebted."

President Edward B. Bunn, S. J.
Georgetown University

"Thanks to your doubling of the annual gifts of one of our generous and loyal friends who works with you at McGraw-Hill, we are well on the way toward creating what for us will be an extremely helpful scholarship fund. This would not have been possible without the gift matching program."

C. Adrian Heaton, President
California Baptist Theological Seminary

Ernest T. Stewart, Executive Director of the American Alumni Council (1785 Massachusetts Avenue, N.W., Washington, D.C.) who would be glad to provide detailed information about them, and the names of companies having such plans. Of the gift matching idea he says,

> "*First*—it assures the corporation that its gifts go direct to those colleges and universities which have furnished it with trained manpower.
>
> "*Second*—it places responsibilities for the gifts on the institutions themselves and drives home the point that they must make a real effort with their own alumni.
>
> "*Third*—it leaves the final decision of corporate support basically to the employees."

For many companies which are fearful of complicating their relations with their customers by courting charges of favoritism if they provide direct financial support for any particular school or group of schools, this latter consideration can be of decisive importance.

The gift matching plan also has what for many companies is the very important virtue of being simply and easily administered. Some additional virtues of the gift matching plan, as seen by officers of institutions which have been beneficiaries, are indicated in the box at the top of this page.

Effective And Easily Managed

We at McGraw-Hill are well pleased with our gift matching program. It is a broad program in which all employees and a wide array of colleges and universities, both privately and publicly supported, are eligible to participate. We commend it as an effective and easily managed plan to provide urgently needed financial aid to higher education.

We also urge that business firms adopt this or one of a number of other very good programs of financial aid to higher education* rather than delay in the hope of hitting upon some quite new and distinctive plan. There are very long odds that such delay will prove unavailing. In the meantime our colleges will be losing financial help which it is profoundly in the interest of the business community and the nation to see that they get—and get fast.

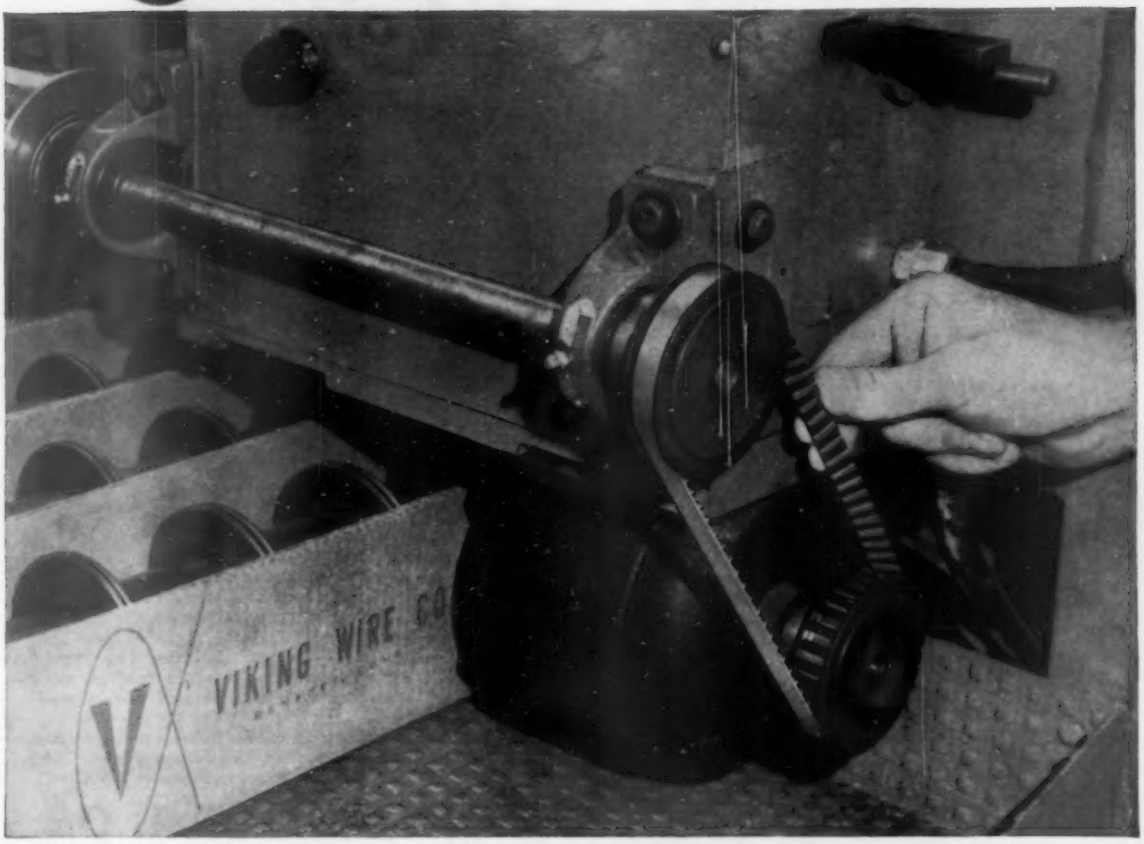
---

*An earlier editorial in this series dealt with tuition supplements as another good way to help our colleges and universities. Reprints of this editorial are available. So are copies of a "more or less socratic dialog," entitled, **A Business Wrestling with the Problem of Aid to Colleges and Universities.** It was prompted by the efforts of McGraw-Hill to find suitable methods of providing financial aid to higher education.

This message is one of a series prepared by the McGraw-Hill Department of Economics to help increase public knowledge and understanding of important nation-wide developments. Permission is freely extended to newspapers, groups or individuals to quote or reprint all or parts of the text.

Donald C. McGraw
PRESIDENT
McGRAW-HILL PUBLISHING COMPANY, INC.

PowerGrip "TIMING"® BELT from the Power Unlimited complete belt line



NO "WRECKS" FOR THE VIKING WIRE CO., INC.

U. S. PowerGrip "Timing" Belts take the "wrecks" out of the Viking Wire Company's operation. This plant is one of the most modern in the business, producing fine-drawn enameled wire for electrical and electronic industrial customers. It specializes in producing long-length wires—giving it a definite sales advantage and profit.

The Viking Co. uses 26 U. S. PowerGrip "Timing" Belts exclusively on its wire-drawing machinery because the belts allow for a constant long-length draw through the dies with uniform speed and constant finished diameter on the wire. This ability to draw an uninterrupted length of wire sharply increases the company's efficiency in the enamel room. The production of long-length wire, once it is enameled, also steps up the production of its industrial customers.

This company also uses numerous U. S. PowerGrip "Timing" Belts in its enameling room because they provide constant speed drive, eliminating burns or over-insulation. A failure caused by a "wreck" always meant great loss in finished wire, with the oven out of production for several hours.

• • •

U. S. PowerGrip "Timing" Belts with speeds ranging to 16,000 r.p.m. and up to 1000 h.p. have made possible the design and production of hundreds of appliances and equipment, ranging from sensitive electronic devices, office machinery, household equipment and gigantic production machinery.

EXTRAS: • You can use a smaller, low-cost motor • Short and fixed centers, high ratio • Reduces assembly costs because fewer units are needed.

One way to get expert and instant power and transmission advice is from the U. S. Distributor.

Mechanical Goods Division

United States Rubber

WORLD'S LARGEST MANUFACTURER OF INDUSTRIAL RUBBER PRODUCTS

Rockefeller Center, New York 20, N.Y. In Canada: Dominion Rubber Company, Ltd.

For more facts Circle 542 on Reader Service Card

Just Published — Second Edition

HOW TO CHART DATA

By PHIL CARROLL

Professional Engineer

250 pages, 6 x 9, 106 illustrations, $7.50

This book shows how many problems involving multi-variables can be solved by means of charts. It shows how charting is both an easy way to compute many answers, and a form of presentation readily understood. The six methods of combining multi-variables are explained with step-by-step charts, and their applications described and illustrated.

Special emphasis is given to solving problems with charts normally thought possible only with operations research and computers. Some of the topics covered include means of combining timestudies and sifting out timestudy wastes . . . analyzing curve families and laying out curves . . . combining equations . . . and setting standards for complex machine set-ups for economical measurement of labor and non-repetitive work. The book is a broadened revision of *How to Chart Time-study Data.*

HOW TO BUILD JOB ENTHUSIASM

Just Out—Presents facts and pointers on building an employee's job interest, making him more aware of his present job and anxious to prepare for a higher job, and on improving his productivity as a result of increased job enthusiasm. Covers such methods of building enthusiasm as communications, meetings, proper delegation of work, testing, and training. **By Ed J. Hegarty, Business Consult. 255 pp., $5.95.**

HOW TO BE A MORE CREATIVE EXECUTIVE

Just Out—Shows how to apply the power of creative thinking to find more imaginative solutions to problems in business management. Gives practical examples of the nature of "creativity" that can help you recognize and develop this asset in yourself and in others. Describes techniques and procedures of creative leadership that bring productive results. **By Joseph Mason, Management Consultant. 281 pp., $5.95**

FREE EXAMINATION

McGraw-Hill Book Co., Dept. FAC-7
327 W. 41st St., New York, 36, N.Y.

Send me book(s) checked below for 10 days' examination on approval. In 10 days I will remit for book(s) I keep plus few cents for delivery costs, and return unwanted book(s) postpaid. (We pay delivery costs if you remit with this coupon—same return privilege.)

☐ Carroll—**How to Chart Data**—$7.50
☐ Hegarty—**How to Build Job Enthusiasm**—$5.95
☐ Mason—**How to Be A More Creative Exec.**—$5.95

Name .....

Address .....

City ..... Zone ..... State .....

Company .....

Position .....

For prices and terms outside U.S. write McGraw-Hill Intl., N.Y.C. 36 FAC-7

ADVERTISERS' LITERATURE

Offered in ads received up to 5th of last month. To get items you want, circle numbers on Reader Service Card next to back cover.

PLANT SERVICES

275—Water Treatment. Bulletin 410-12-7 describes treatment to reduce corrosion. Hagan Chemical & Controls, Inc.

276—Dust Filters. Catalog 104 (36 pages) gives complete facts on Dynaclone dust filters. W. W. Sly Mfg. Co.

277—Water Fountains. Latest catalog lists full line of water fountains and coolers. Halsey W. Taylor Co.

278—Air Conditioning. Ask for booklet, "Will factory air conditioning pay off for me?" Carrier Corp.

279—Metal Lumber. Information on slotted angle tells adaptability for many applications. Republic Steel Corp.

280—Compressors. Catalog lists full line of compressors to meet a wide range of applications. Atlas Copco.

281—Water Meters. Bulletin 43 describes and illustrates meters for every need. Buffalo Meter Co., Inc.

282—Steel Lockers. Tells about big and roomy steel lockers, bonderized for long service. Republic Steel Corp.

283—Plastic Pipe. Information and performance data on uses in severe corrosion cases. Republic Steel Corp.

284—Steel Shelving. Catalog (92 pages) covers clip and stud-type shelving. Lyon Metal Products, Inc.

285—Air Regulators. Catalog 158 gives complete data on maker's line of air products. Wilkerson Corp.

286—Steel Pipe. Information on sizes and weights; comes in black or galvanized finish. Republic Steel Corp.

287—Incinerators. Free bulletins on incinerators for every waste disposal need. Joseph Goder Incinerators.

288—Steel Shelving. Catalog lists data and features of bracket-supported shelving. Borroughs Mfg. Co.

289—Metal Hose. Catalog ID-100D describes complete line of flexible hose products. Universal Metal Hose Co.

290—Compressors. Literature on two-stage compressors—available in 12 sizes. Allis-Chalmers Mfg. Co.

291—Cabinet Benches. Line has interchangeable accessories. Columbia-Hallowell Div., Standard Pressed Steel.

292—Pilot Positioner. Bulletin V-530 gives details on rubber diaphragm-operated valves. Johnson Service Co.

293—Radio Pager. Facts on transistorized personal tone signaling unit. Motorola Communications & Electronics.

294—Fans. Catalog 517 gives full information; selector charts, capacity tables, dimensions. Clarage Fan Co.

295—Industrial TV. Information and guide to closed-circuit TV. Government & Industrial Group, Philco Corp.

296—Acoustical Phone Booths. Bulletin A-142-4T gives complete details on varied models. Burgess-Manning Co.

ELECTRICAL

297—Plug-in Duct. Bulletin SD-110 gives facts, discusses features of aluminum plug-in duct. Square D Co.

298—Motors. Bulletin 194 describes multi-shielded a-c squirrel-cage motors. Sterling Electric Motors, Inc.

299—Electronic Tubes. Here's a descriptive booklet, "Sylvania Industrial Tubes." Sylvania Electric Products, Inc.

300—Equipment Control Connectors. Catalog B-72 on sizes from 2 to 12 poles, standard cable lengths. Joy Mfg. Co.

301—Safety Switch. Bulletin gives complete data and performance features of equipment. Square D Co.

302—Fuses. Bulletin LPS on low-peak fuses—15 to 600 amp. in 250- and 600-volt ranges. Bussmann Mfg. Div.

303—Magnetic Starter. Bulletin SM-297 features new small magnetic starter for low-hp. jobs. Square D Co.

304—Adjustable Speed Drives. Bulletin GEA-6999 lists line to meet varied applications. General Electric Co.

PRODUCTION

305—Masking Tape. Gives information on use for long, straight lines on wood or metal. Shuford Mills, Inc.

306—Pipe Machines. New catalog on power drives and pipe threading machines. Toledo Pipe Threading Machine Co.

307—Controlled Air Devices. "Idea File" contains installation data, wiring diagrams, etc. Bellows Co., Valvair Corp.

Turn the page

For more facts Circle 543 on Reader Service Card ➤

Right, PPG insulation is easily cut to size on the job. Left, Foreman Charles W. Booth, of Acheson Sheet Metal Company, supervises installation of ductwork. PPG Neoprene-coated Duct Liner meets all requirements of NBFU Bulletins No. 90-A and 90-B for ducts, and bears the label of Underwriters' Laboratories, Inc.

The inside story on a hush-up job in Tampa

(with PPG Fiber Glass Insulation, of course!)

It will be quiet, as well as comfortable around the new State Agency Building at Tampa, Florida, because PPG Fiber Glass Insulation has been installed in the ductwork of the heating and air conditioning system.

Job foreman Charles W. Booth of Acheson Sheet Metal Company, Jacksonville, installers of the ductwork, reports that the long life-expectancy of PPG Neoprene-coated Fiber Glass is of great importance in the choice of this insulation, because of the difficulty of replacement in a duct system.

It's what's inside that counts!

Mr. Booth says that PPG Insulation has extraordinary sound-deadening qualities which eliminate fan noise, has excellent thermal-barrier characteristics, and low resistance to air flow. In addition to ease of handling and installation, it will not be affected by humidity, won't swell, rot or decay . . . very important in Tampa-types of climates!

Get best results with PPG

Available in a range of sizes, densities, and facings to meet any insulation specification. For more information, contact your nearest Fiber Glass Sales Office, or write *Pittsburgh Plate Glass Company, Fiber Glass Division, One Gateway Center, Pittsburgh 22, Penna.*

Sales Offices: Atlanta, Attleboro, Buffalo, Charlotte, Chicago, Cincinnati, Cleveland, Dallas, Denver, Detroit, Fort Wayne, Houston, Kansas City, Los Angeles, Louisville, Milwaukee, Minneapolis, New Orleans, New York, Philadelphia, Pittsburgh, San Francisco, St. Louis and Washington.

FIBER PG GLASS PITTSBURGH PLATE GLASS COMPANY

Attractive, Level, Flood-Free Land Close to Metropolitan Markets of Pittsburgh, Cleveland and Buffalo

This adaptable 750 acre plant site is ideally located adjacent to Greenville, Pa., and is only 80 miles from Pittsburgh and Cleveland; only 150 miles from Buffalo. Next day rail delivery to these points.

Extensive deposits of coal, limestone, clay and aggregates nearby. Steel and other basic materials available with 24-hour delivery service.

Investigate today! Write or phone for *location factors* of this site.

BESSEMER and LAKE ERIE RAILROAD CO.

INDUSTRIAL DEVELOPMENT DEPARTMENT

1828 FRICK BUILDING • PITTSBURGH 30, PA. • ATLANTIC 1-4780

The Bessemer Man is at your "Site Service"

ADVERTISERS' LITERATURE

Begins on page 254

Offered in ads received up to 5th of last month. To get items you want, circle numbers on Reader Service Card next to back cover.

308—Magnetic Drums. Descriptive literature includes installation and application information. Eriez Mfg. Co.

309—Magnetic Pulleys. Fact-filled bulletin (6 pages) has installation photos, selector guide. Eriez Mfg. Co.

310—Fast-Lead Sockets. Catalog 30-A gives facts on sockets for bolts and nuts. Apex Machine & Tool Co.

311—Pliers. Catalog lists complete series, plus full range of wrenches and hand tools. Snap-On Tools Corp.

312—Heat Exchangers. Bulletin P60 contains details on structural features and applications. Tranter Mfg., Inc.

313—Visible Records. Free booklet on production planning and visual control panels. Acme Visible Records, Inc.

314—Air-Powered Hammer. Brochure (8 pages) provides information on new three-way drill hammer. Skil Corp.

315—Schedule Board. Free guide has full-scale sample chart section. Conley, Baltzer and Steward.

316—Roller Chain. Book (2657) in 154 pages gives complete data on roller chain, plus applications. Link-Belt Co.

317—Schedule Board. Booklet X-500 (24 pages) shows application of visual control board. Graphic Systems.

PLANT SITES

318—Kentucky. Offers free services to assist in location of new plant locations. Commonwealth of Kentucky.

319—Greenville, Pa. Free booklet and other information on industrial site locations. Reynolds Development.

MAINTENANCE

320—Maintenance Truck. Here's job data on maker's F-10 motorized platform truck for varied use. Prime-Mover Co.

321—Dry-Scrubber. Literature describes machine for cleaning grease-caked floors. Finnell System, Inc.

322—Paint. Booklet, "How to Put Color to Work" helps select right paints. E. I. du Pont de Nemours & Co.

323—Vacuum Cleaners. Catalog 155B gives complete data on portable or installed units. Spencer Turbine Co.

Turn the page

Here's How 2-Strip Sealing Saves Shipping Room Costs

TWO-STRIP SEALING
240 boxes per hour*

GLUING
185 boxes per hour*

STAPLING
101 boxes per hour*

The two-strip sealing method has been made possible by the use of reinforced sealing tape. It has revolutionized carton sealing methods by providing remarkable savings in labor and time. Tests indicate that it is faster than either gluing or stapling. Furthermore, you save two-thirds the time needed for the conventional way of tape-sealing cartons. All carriers have approved the two-strip sealing method using reinforced tape.

Write for further information which will help your shipping room secure these economies. Address our home office in Attleboro, Massachusetts.

*Results of tests by independent laboratory

SISALKRAFT

AMERICAN SISALKRAFT CORPORATION
Chicago 6 • New York 17 • San Francisco 5
In Canada: Murray-Brantford Ltd., Montreal

reinforced paper, foil and plastics for construction, industrial packaging and agriculture

J. K. LASSER'S EXECUTIVE'S GUIDE TO BUSINESS PROCEDURES

Checklists for Successful Management

Just Published. In easy-to-use checklist fashion, this book tells what to do, what not to do, and what to look out for when handling virtually any business problem. Gives hundreds of pointers, tested solutions, workable methods, and helpful suggestions which lead to profitable and effective business decision making. **Edited by Sydney Prerau, Director, J. K. Lasser Tax Institute. 256 pp., $4.95**

HANDBOOK OF PERSONNEL MANAGEMENT AND LABOR RELATIONS

Fundamentals and practices meeting the whole range of present-day personnel and labor problems, covered in detail by outstanding experts—with a wealth of facts, methods, pointers, data, and examples. **By Dale Yoder and H. G. Heneman, Jr., Industrial Relations Center, Univ. of Minn.; John G. Turnbull, School of Bus. Admin., Univ. of Minn.; and C. Harold Stone, South Porto Rico Sugar Co. 1216 pp., 150 illus., $12.50**

THE EVALUATION INTERVIEW
Predicting Job Performance in Business and Industry

Gives you practical help on how to appraise men for higher-level jobs in plant or office and shows how to interview applicants effectively in order to predict their job performance. Gives scores of sample questions and a ready-to-use Interview Guide. **By Richard A. Fear, The Psychological Corp. 299 pp., $6.00**

MANAGER SELECTION, EDUCATION AND TRAINING

Explains how to develop management personnel at every level—from front-line foreman to top executives. Provides help in starting a manager development program or appraising an existing one. Covers selection, background education, and experience training. **By Willard E. Bennett, Cities Service Refining Corp. 210 pp., $6.00**

PROFESSIONAL ENGINEER'S EXAMINATION QUESTIONS AND ANSWERS

Just Published—Second Edition. Gives 600 questions and complete answers to help engineers pass state license examinations. Covers mechanical, electrical, civil, and chemical engineering, and includes engineering economics and land surveying. Questions reflect latest exam trends—suitable for all states. **By William S. La Londe, Newark College of Eng. 2nd Ed., 615 pp., 273 illus., $7.50**

SEE THESE BOOKS 10 DAYS FREE

McGraw-Hill Book Co., Dept. FAC-7
327 W. 41st St., New York 36, N. Y.

Send me book(s) checked below for 10 days' examination on approval. In 10 days I will remit for book(s) I keep, plus few cents for delivery costs, and return unwanted book(s) postpaid. (We pay delivery costs if you remit with this coupon—same return privilege.)

- ☐ Prerau—**Lasser's Exec. Guide to Bus. Procedures,** $4.95
- ☐ Yoder, et al.—**Handbk Personnel Mgmt. & Labor Relations,** $12.50
- ☐ Fear—**The Evaluation Interview,** $6.00
- ☐ Bennett—**Manager Selection, Education & Training,** $6.00
- ☐ La Londe—**Prof. Eng. Exam Ques. & Ans.,** $7.50

(PRINT)

Name .....

Address .....

City ..... Zone ... State .....

Company .....

Position .....

For price and terms outside U.S. write McGraw-Hill Int'l., N.Y.C. FAC-7

ADVERTISERS' LITERATURE

Begins on page 254

Offered in ads received up to 5th of last month. To get items you want, circle numbers on Reader Service Card next to back cover.

324—Paint. Free booklet, "How to Save Safely When Painting Your Plant" upon request. Sherwin-Williams Co.

325—Absorbent Compound. Free sample for removing oil, grease, liquids from floors. Minerals & Chemicals Corp.

326—Paint. New booklet, "How to Reduce Painting Costs" for interiors and exteriors. Barreled Sunlight Paint Co.

327—Rust Preventive. Two helpful charts give specifications, applications, comparative data. Valvoline Oil Co.

328—Machine Mounts. Sample and free book give full data on line of mounts. Unisorb Div., Felters Co.

329—Paint Pigments. Booklets, "Painting With Aluminum" and "Aluminum Roof Coatings." Aluminum Co. of America.

330—Protective Coatings. Here's full information on line of coal-tar based coatings. Koppers Co., Inc.

331—Building Maintenance. Tells about work standards system of maintenance. Industrial Sanitation Counselors.

MATERIAL HANDLING

332—Bulk Handling Equipment. New 28-page Brief 160 is filled with facts on new techniques. Dempster Bros., Inc.

333—Lift Trucks. Bulletin BU-640 gives details on three new series F trucks. Allis-Chalmers Mfg. Co.

334—Monorails. Bulletin C-2 contains full information, including applications. American Monorail Co.

335—Transporter/Tractor. Gives helpful facts on new remote-controlled UTE model. Automatic Transportation Co.

336—Tote Boxes. Bulletin 0-6 lists sizes and styles of vulcanized fibre containers. National Vulcanized Fibre Co.

337—Electric Fork Truck. Full details on two F-45T models: 3000- and 4000-lb. capacity. Elwell-Parker Electric Co.

338—Levelator Lifts. Catalog RE-203 gives full data on oil-hydraulic powered equipment. Rotary Lift Co.

339—Electric Hoist. Data on models—250-, 500-, 1000-, or 2000-lb. capacities. Shepard Niles Crane & Hoist Corp.

Turn the page

How To Get Things Done Better And Faster

BOARDMASTER VISUAL CONTROL

- ☆ Gives Graphic Picture — Saves Time, Saves Money, Prevents Errors.
- ☆ Simple to operate — Type or Write on Cards, Snap in Grooves
- ☆ Ideal for Production, Traffic, Inventory, Scheduling, Sales, Etc.
- ☆ Made of Metal. Compact and Attractive. Over 500,000 in Use

Full price $49.50 with cards

FREE 24-PAGE BOOKLET NO. X-500 Without Obligation

Write for Your Copy Today

GRAPHIC SYSTEMS
Yanceyville, North Carolina
Circle 546 on Reader Service Card

LOOKING FOR...

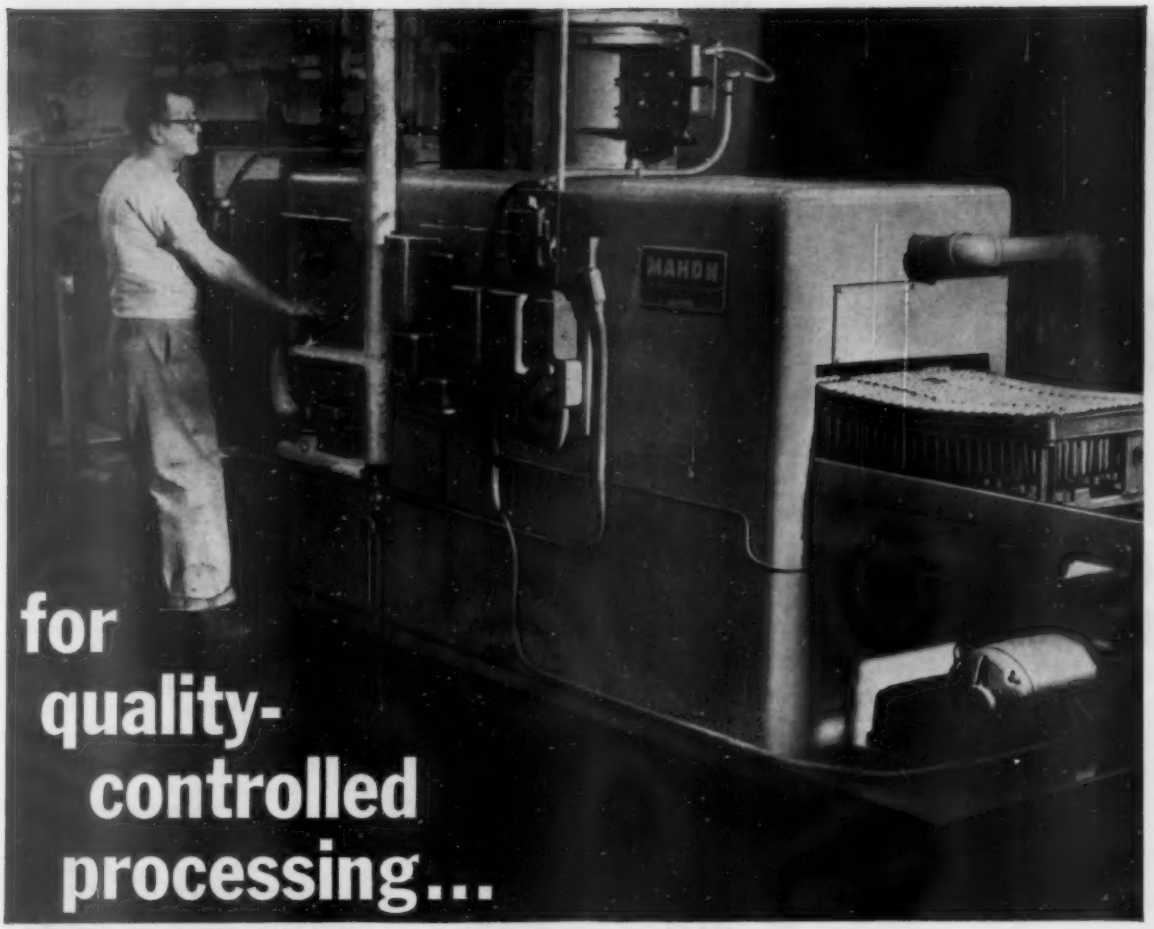
EMPLOYMENT
BUSINESS OPPORTUNITIES
NEW SALES OUTLETS
EQUIPMENT
(Surplus, new, used, rebuilt)

Turn to the

SEARCHLIGHT SECTION

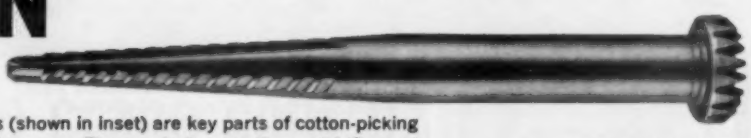
CLASSIFIED ADVERTISING

Where New Opportunities Constantly Appear in Every Issue



for quality-controlled processing... industrial equipment by MAHON

'cotton-picking' spindles thoroughly cleaned 500 at a time for International Harvester



Hardened, chromium-plated, barbed spindles (shown in inset) are key parts of cotton-picking machines made by International Harvester Company. These spindles are the metal 'fingers' that actually field-pick the cotton—several million are produced each year at IH's Memphis, Tenn., Works. A critical step in processing these parts is thorough cleaning before heat treating and plating. Removal of oil, grease, and foreign matter from the spindle surfaces is essential to insure uniform hardness . . . and long product life.

For **"quality-controlled processing"** the spindles are washed and dried in Mahon equipment. This special machine, developed for International Harvester from Mahon Industrial Equipment Division 'almost-standard' designs, means production efficiency . . . product quality . . . faster delivery and reasonable cost. Over the years Mahon equipment is your best investment. Call in a Mahon industrial engineer; let him prove why.

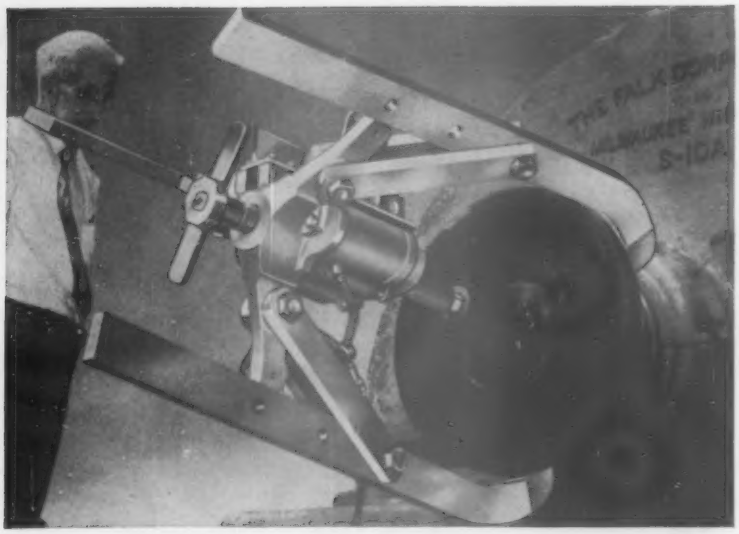
In cleaning a 500-piece-load of cotton-picking spindles, the two-stage Mahon machine washes the parts with detergent in hot water (at 180°F); then hot-air dries the load at (250°F). Automatic cycle time is about 15 minutes per load.

YOUR BIGGEST VALUE IS IN MAHON'S PLANNING & ENGINEERING EXPERIENCE

THE R. C. MAHON COMPANY
DETROIT 34, MICHIGAN
MANUFACTURING PLANTS—Detroit, Michigan and Torrance, California
SALES-ENGINEERING OFFICES—Detroit, New York, Chicago, San Francisco and Torrance.

MAHON

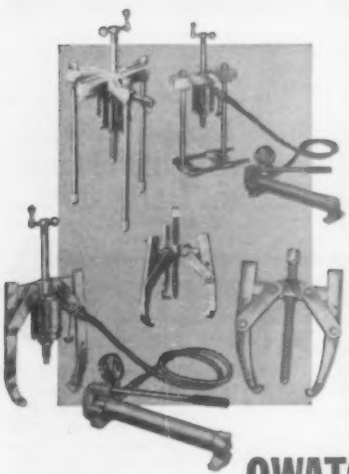
For more facts Circle 547 on Reader Service Card



OTC 100-ton puller quickly removes flange frozen to shaft for two years

Because a coupling flange defied removal, a giant speed-reducing unit rusted outside for two years — until an OTC hydraulic "Grip-O-Matic" puller solved the problem and eased the flange off the shaft . . . without damage. A special job like this typifies the ability of OTC pullers — from the tiny ½-ton size to the giant 100-ton size — to solve the toughest of pulling problems and thereby keep maintenance costs to a minimum!

OTC MAINTENANCE TOOLS FOR EVERY INDUSTRIAL NEED



You will cut maintenance costs and eliminate excessive machine "down-time" by having the right tools to do the job — dependable, easy to use OTC hydraulic pulling tools.

Remove and install gears, bearings, bearing cups, wheels, sheaves, shafts, couplings, sprockets, pulleys, etc., quickly and easily . . . and without damage to parts! Complete hydraulic maintenance sets are available in 17½, 30 and 50-ton capacities and pay for themselves in just a few jobs. Continue to modernize your maintenance techniques by adding time-saving OTC hydraulic maintenance equipment to your shop.

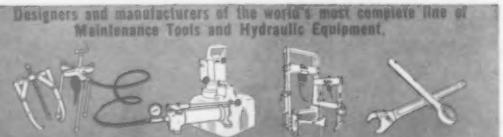
For further information contact your OTC distributor, or write:

OWATONNA TOOL COMPANY

399 CEDAR STREET • OWATONNA, MINNESOTA

RESEARCH · ENGINEERING · DEVELOPMENT · OTC

Designers and manufacturers of the world's most complete line of Maintenance Tools and Hydraulic Equipment.



PULLERS AND PULLER SETS • HYDRAULIC RAMS AND PUMPS • HYDRAULIC SHOP PRESSES • HAND TOOLS

ADVERTISERS' LITERATURE

Begins on page 254

Offered in ads received up to 5th of last month. To get items you want, circle numbers on Reader Service Card next to back cover.

340—Overhead Cranes. Data Booklet 2008 is packed with useful data. Well illustrated. Cleveland Tramrail Div.

341—Tractor-Shovels. Ask for booklet, "Industrial Materials Handling the Payloader Way." Frank G. Hough Co.

342—Overhead Cranes. Bulletin C-42 gives data on complete line for varied applications. Harnischfeger Corp.

343—Electric Hoists. Bulletin H-55 has full information on single- or two-speed models. Harnischfeger Corp.

BUILDING

344—Floor Grating. New catalog provides structural data and suggests varied applications. The Globe Co.

345—Trackage. Free track kit illustrates elements needed for an efficient industrial siding. L. B. Foster Co.

346—Smokestacks. Full facts on glass-lined stacks now available in a variety of colors. A. O. Smith Corp.

347—Trackage. Catalog has complete data on line of equipment for industrial siding. Connors Steel Div., H. K. Porter Co.

348—Glazing. New folder (SL-1) provides details on features of glass fiber panels. Structoglas, Inc.

349—Door Operator. Bulletin gives mechanical data, plus features of power-operated unit. Kinnear Mfg. Co.

350—Utilities. Information on facilities available in northern plains of Nebraska. Northern Natural Gas Co.

Human relations help

Here are some of FACTORY's reprinted articles on human relations. Order them (by code number) from FACTORY Reader Service, 330 W. 42nd St., New York 36.

35¢ per copy

A172 Sure Way to Measure Managers
A185 How to Measure Your Managers
A207 Three Rules to Help You Stop the Thieves in Your Plant
A213 Shift Scheduling Made Easy

50¢ per copy

A126 Taking the Doubletalk Out of Communications
A153 Tips to Successful Discipline
A170 Handling the Problem Worker

Westinghouse crane control

Precision built to crane-duty standards . . . long-term, low-cost service with easy operation and low maintenance costs . . . the most complete line of magnetic crane control available . . . 'round-the-clock service facilities in all areas . . . all components service-proved . . . undivided responsibility from one supplier . . . just several of the reasons why you can count on dependable, more economical service from cranes equipped with Westinghouse control. Your nearby Westinghouse salesman has all the cost-saving facts. Or, write Westinghouse Electric Corporation, P.O. Box 868, 3 Gateway Center, Pittsburgh 30, Pennsylvania. J-22145

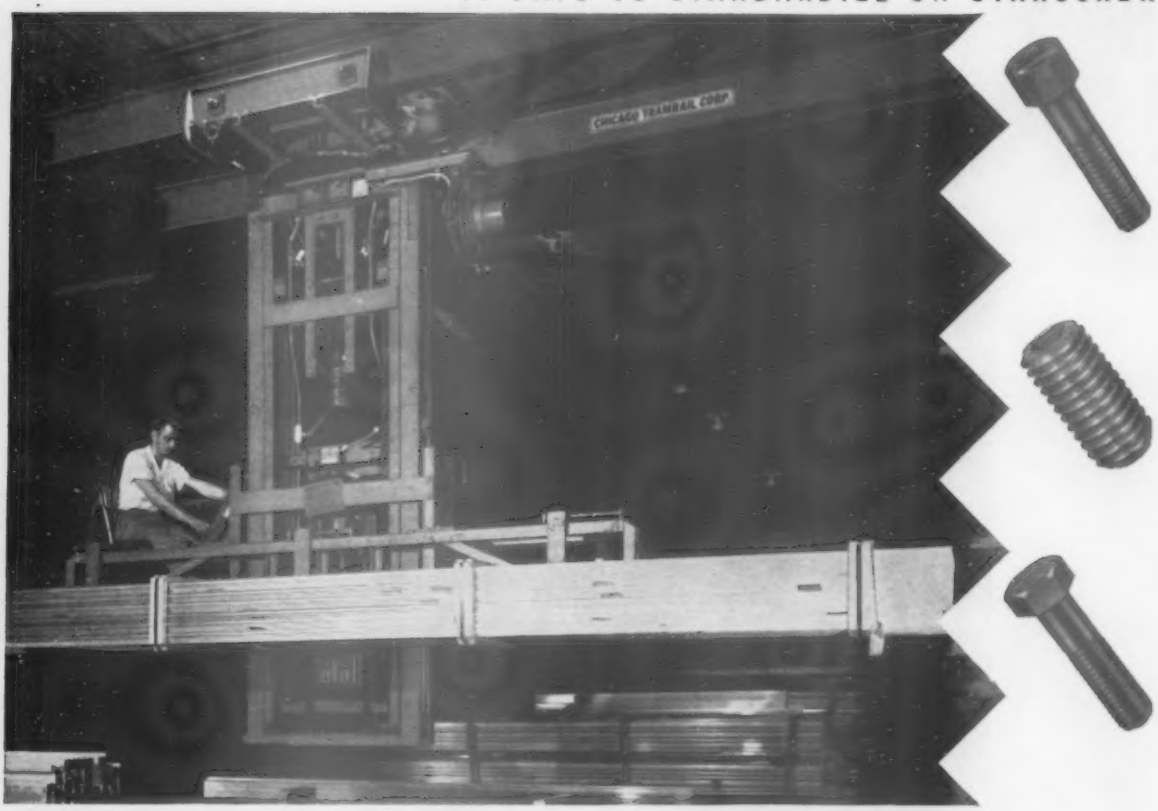
Photo above shows material bay of main carshop of Norfolk and Western Railway in Roanoke, Virginia, in which operate two twenty-five ton Whiting cranes, equipped with Westinghouse Load-O-Matic* a-c control systems, handling heavy plate and other material for car-manufacturing operation. Westinghouse Load-O-Matic crane control is ideal for applications requiring unusual stamina, ease of operation and low maintenance cost. Provides smooth, stepless speed control without the cost and complexity of d-c conversion equipment. *Trade-Mark

YOU CAN BE SURE...IF IT'S Westinghouse

TUNE IN WESTINGHOUSE-CBS TV-RADIO COVERAGE, PRESIDENTIAL CONVENTIONS, JULY 10-29

For more facts Circle 549 on Reader Service Card

IT PAYS TO STANDARDIZE ON **STANSCREW**



17 different Stanscrew fasteners used in Chicago Tramrail's Trak-Rak

"In constructing our complete line of cranes we make no compromise with the most rigid requirements of safety," says S. W. Fountain, Vice-President, Chicago Tramrail Corporation. "Therefore, reliability is our principle reason for standardizing on quality components such as Stanscrew fasteners."

"But Stanscrew gives us more than fast service and reliable products. Their broad line of over 5,000 fasteners offers a wide selection . . . and their fastener specialists and engineers are always ready to assist our design department in determining the strongest, safest, most economical fastener for every application. For example, in our Trak-Rak stacking crane above, 17 different Stanscrew fasteners are used . . . each selected after careful study for the precise job it has to fill."

Like Chicago Tramrail, many other industrial leaders have learned it pays to capitalize on Stanscrew's backlog of over 80 years of fastener experience. To use this accumulated knowledge in solving your particular fastener problem, just call your Stanscrew distributor. He will quickly arrange for a visit from your Stanscrew fastener specialist.

STANSCREW FASTENERS

CHICAGO | THE CHICAGO SCREW COMPANY, BELLWOOD, ILLINOIS
HMS | HARTFORD MACHINE SCREW COMPANY, HARTFORD, CONNECTICUT
WESTERN | THE WESTERN AUTOMATIC MACHINE SCREW COMPANY, ELYRIA, OHIO

STANDARD SCREW COMPANY 2701 Washington Boulevard, Bellwood, Illinois

For more facts Circle 550 on Reader Service Card

NEW CATALOG Describes Latest Developments in Waste and Refuse Storage and Removal

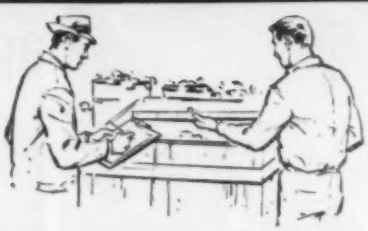
New Techniques Cut Cubic Yard Removal Costs to Record Low

This new 28-page color catalog describes remarkable new developments in waste control and disposal that have, within the last two years, obsoleted many systems now in use. Cubic yard handling costs have been reduced to a point where many firms and municipalities are saving thousands of dollars annually that they were previously spending to operate old-style equipment.

Materials handling and waste disposal are two of the few areas of large potential cost reduction remaining in manufacturing and municipal administration. This new catalog has a bearing on both of these areas of operation.

To get your copy of this new fact-filled catalog, write today.

DEMPSTER BROTHERS
Inc.
DEPT. F-7 KNOXVILLE 17, TENN.



FREE SURVEY WITHOUT OBLIGATION
Dempster Field Engineers, located in all sections of the country, make thousands of cost-finding refuse storage and collection surveys every year, without cost or obligation. If you would like to know your disposal costs, and what—if any—avenues of improvement exist, write today on your letterhead.

28 Page Catalog FREE

Dempster Brothers, Dept. F-7
Knoxville 17, Tennessee
Please Send New Catalog Brief 160

Name _____
Title _____
Firm _____
Address _____
City _____ State _____

How "SILENT SOUND" stopped the THIEVES!

THE FOLLOWING IS AN ACTUAL CASE HISTORY —AN EXAMPLE OF HOW "SILENT SOUND" —ONE OF SCIENCE'S MOST EFFECTIVE THIEF-TRAPS IS AIDING POLICE IN THEIR FIGHT AGAINST CRIME. ONLY THE NAMES HAVE BEEN CHANGED.

4:45 A.M.
WHAT DO YOU MAKE OF IT, JIM? FALSE ALARM?
COULD BE, BILL, BUT I DOUBT IT. I'LL BET SOMEONE WAS HERE. MAYBE WE'LL HEAR FROM IT AGAIN.

The "secret" was ultrasonic sound—flooding the office at a frequency too high for the human ear to detect. The moment the burglar entered the plant office his movements altered the frequency, triggered the alarm. When the police arrived he hid above a false ceiling and didn't move until 6:10 when he crawled out. Again, his movements tripped the alarm.

Kidde ultrasonic intruder detection systems are foolproof and tamper-proof. Can't be bypassed by break-ins or lock-ins. Sounds alarms locally or at a central alarm station. Properly installed, it qualifies for an Underwriters' Laboratories Number Two Certification.

For more information on low-cost *positive* burglar detection equipment, write Kidde today.

Kidde

Kidde Ultrasonic & Detection Alarms, Inc.
732 Brighton Road, Clifton, New Jersey
A Subsidiary of Walter Kidde & Company, Inc., Belleville 9, N. J.

WHERE TO BUY

Featuring additional products, specialties & services for manufacturing plants

MORT CLARK'S **GALV-WELD** ALLOY ORIGINAL & GENUINE

Solves 1000 factory maintenance corrosion problems permanently. Used extensively in specially-built machines and installations by maintenance departments. Solves roof cooling tower corrosion problems. Write for details. Free sample. GALV-WELD PRODUCTS, Dept. F, P. O. Box 1305, Bradenton, Florida.

ROBOT OPERATORS
OPEN - CLOSE - LOCK DOORS, GATES
...Electronically
COMMERCIAL, INDUSTRIAL RESIDENTIAL & SPECIAL
Write for Catalog
ROBOT INDUSTRIES, INC.
7041 ORCHARD - DEARBORN, MICHIGAN

INDUSTRIAL CONSULTANTS

DRAKE, STARTZMAN, SHEAHAN and BARCLAY
Distribution and Materials Handling Consultants
"Control, Movement and Storage of Materials"
41 East 42nd Street New York 17, N. Y.

GEMAR ASSOCIATES
CONSULTING
MATERIALS HANDLING ENGINEERS
over 25 years experience
Greenwich, Connecticut

METHODS ENGINEERING COUNCIL
DIVISION OF H. B. MAYNARD AND COMPANY, INCORPORATED
MANAGEMENT CONSULTANTS
718 Wallace Ave.—Pittsburgh 21, Pa.

Consult these SPECIALISTS
Let them save your time by bringing their broad experience in their specialty to bear on your problems.

SUBSTITUTES CRANES for BRAWN ...and BOOSTS LATHE PRODUCTION

One Crane for Every 6 Production Workers

Hand-propelled gantry cranes serve both sides of the Lathe Assembly Dept. 125 Cleveland Tramrail cranes, both standard overhead and gantry types, serve the Monarch plant.

EVERY manufacturer recognizes the need of mechanical handling equipment for hoisting and moving parts weighing hundreds of pounds, but not so many appreciate the value of cranes for handling parts that are within a man's ability to lift.

The Monarch Machine Tool Company, Sidney, Ohio, the world's largest exclusive manufacturer of lathes, made a thorough study of the effects of heavy manual lifting. They found that parts weighing only 50 or 75 pounds can be the cause of smashed fingers, hernias, and other injuries. When such parts must be handled numerous times a day, worker fatigue becomes a serious problem and affects not only production but workmanship.

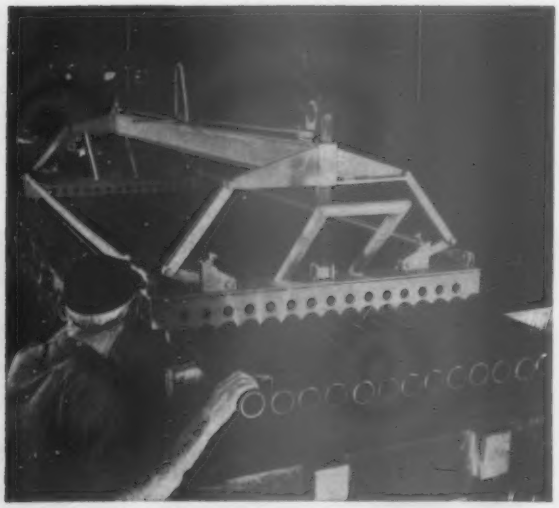
Cleveland Tramrail cranes have proven to be the solution to the problem. For more than 15 years Monarch has been using Cleveland Tramrail equipment and today has 125 cranes of the standard overhead and gantry types which provide handling service throughout its fine modern plant. The importance attached to cranes here is attested by the fact that one crane is provided for every six production workers on the job at any one time.

WRITE FOR FREE COPY of Engineering and Data Booklet No. 2008. Packed with valuable information. Profusely illustrated.

CLEVELAND TRAMRAIL

Overhead Materials Handling Equipment

CLEVELAND TRAMRAIL DIVISION • THE CLEVELAND CRANE & ENGINEERING CO. • 3222 E. 290 ST. • WICKLIFFE, OHIO

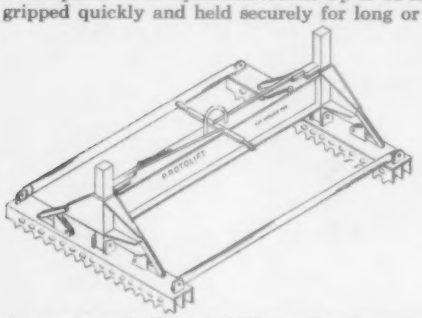


"We reduced our handling cost 50%" ...with new HEPPENSTALL PROTOLIFT*

Here's what Mr. W. D. Davis, Houston, Texas, Terminal Manager for T. E. Mercer Trucking Company, has to say about Protolift:

"Our 15 joint, 2⅜" O.D. Protolift has handled as much as 100,000 feet a day, reducing our handling cost 50% over rolling or sling lifting. It has handled over 300,000 tons of casing, with no maintenance except lubrication."

In one lift, Protolift picks up an entire row of pipe, tubing or cylindrical products of equal diameters. Up to 15 lengths can be gripped quickly and held securely for long or short hauls.



To grip, one row of alloy steel "fingers" turn around the outside surface of the pipe . . . while another row turn around the opposite side. Thus, each length is gripped around more than half its circumference, at both ends.

Protolifts in use at the present time handle up to 15 lengths of pipe or tubing. Why not see if Protolift can't cut *your* handling costs? Write today for data sheet, or tell us your requirements and we'll give you specific information and a quotation.

SEE PROTOLIFT IN ACTION. *We'd like to show you an 8-mm color film, demonstrating Protolift in actual use.* Address your inquiry to Heppenstall Company, Materials Handling Division, New Brighton, Pa. *Patented 9250

HEPPENSTALL COMPANY
Pittsburgh 1, Pennsylvania
Plants: Pittsburgh and New Brighton, Pa. • Bridgeport, Conn.

MIDVALE-HEPPENSTALL COMPANY
Nicetown, Philadelphia 40, Pa.

Die Blocks - Forgings - Back-Up Roll Sleeves - Rings - Industrial Knives
Materials Handling Equipment - Pressure Vessels - Hardened and Ground Steel Rolls - Vacuum and Consumable Electrode Melted Steels

IF IT HANGS FROM A CRANE... HEPPENSTALL CAN HANDLE IT

SEE OUR CATALOG IN SWEET'S PLANT ENGINEERING FILE OR WRITE FOR COPY

266 For more facts Circle 554 on Reader Service Card

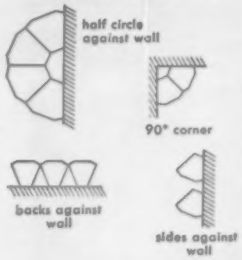
BURGESS-MANNING PHONE BOOTH *puts you in a* "VACUUM QUIET"

No matter how noisy the location—Burgess-Manning "Hear-Here" Acousti-Booths permit phone conversations with the privacy and quiet of the home.

Burgess-Manning "Hear-Here" Acousti-Booths offer these distinctive advantages: • no noise in • no conversation out • "vacuum quiet" • doorless • no odors • no glass to break • no hinges to stick • no dirt-collecting corners.

A completely new "theft-proof" mounting bracket makes the phone an integral part of the "Hear-Here" Acousti-Booth. Also available are side or back brackets for easy, quick mounting of booth.

Unique Design of Acousti-Booth makes possible multiple installation in less space.



Today . . . write for Bulletin No. A-142-4T for complete details of Model 45 "Hear-Here" Acousti-Booth—Also other models available.

3 Heating Cooling Ventilating

BURGESS-MANNING COMPANY
Architectural Products Division
749 East Park, Libertyville, Ill.

For more facts Circle 555 on Reader Service Card

New low-cost way to set up a department, enclose areas . . . change plant layout

WIPCO MOVEABLE WIRE PARTITIONS

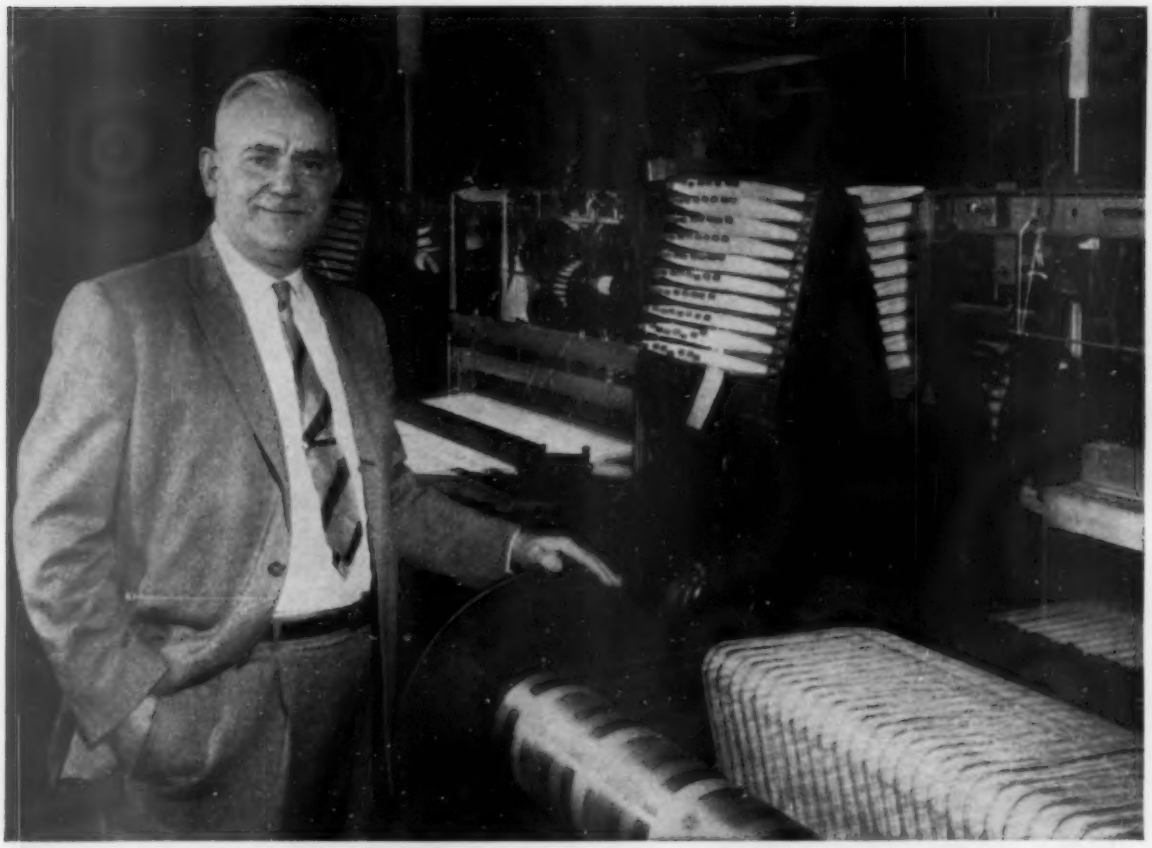
NO SPECIAL TOOLS . . . NO SPECIAL CREWS NEEDED—*your own men* set them up, relocate them . . . *at less than the cost of wood framing and wire netting!* Everything you need—Standard panels plus all accessories (doors, windows, top panels, bars, braces, etc.)—available immediately from factory stock. Made of tough, machine woven steel wire, Wipco Partitions protect areas against theft and loss, permit ventilation and visibility . . . economical to maintain. *For firm price, send free hand sketch of areas to be enclosed.*

Write Today for Bulletin P-55

Wire and Iron Products, Inc.,
1738 Sixteenth St., Detroit 16, Mich.

WIPCO

For more facts Circle 556 on Reader Service Card



Mr. Walter E. Baur, Plant Superintendent of the Bloomsburg Mills in Lock Haven, Pennsylvania, says:

"Our Honeywell air cleaning system helped us cut rejects more than 30 per cent"

Fabrics stay much cleaner at Bloomsburg Mills because Honeywell air cleaning removes 90 per cent of airborne dirt.

"We recommend Honeywell electronic air cleaning without reservation," says Mr. Baur. "Airborne dirt is ordinarily a very serious problem; but in our plant, even overhead fixtures, piping, etc. are free from dust and lint. Woven goods, particularly the loom-finished whites are much cleaner. Rejects have been reduced more than 30 per cent!"

Honeywell installed a high capacity electronic air cleaner in Bloomsburg Mills' ventilating system. As a result, the plant's water-spray tank, which had to be cleaned weekly, is now free of dirt sediment. Ninety per cent of airborne dirt is stopped by the air cleaning system!

According to Baur, employees enjoy new vitality and are more productive in this fresh, clean environment.

Your plant also will benefit from Honeywell electronic air cleaning. Honeywell will gladly work with your architect and engineers from the planning to the operational stage. Contact any one of 112 local Honeywell offices. Or write Honeywell, Dept. FM-7-70, Minneapolis 8, Minnesota.

Plant Engineer Jim Andrus at Honeywell Control Cubicle where he directs the entire air cleaning operation.

Honeywell

First in Control

SINCE 1885

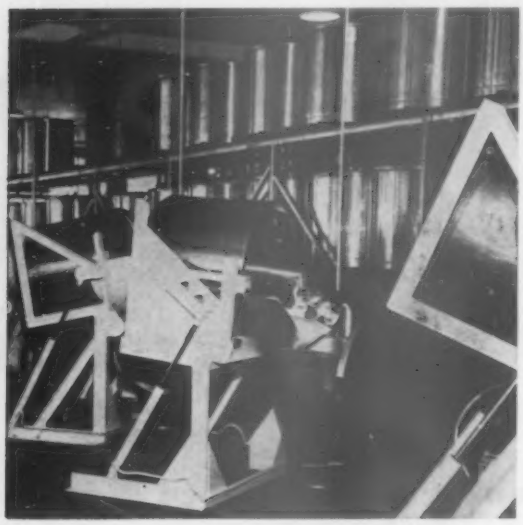
75th YEAR PIONEERING THE FUTURE

For more facts Circle 557 on Reader Service Card

TUBAR DUMPERS

Solve Another Handling Problem!

Large, National Cosmetics Firm Uses Tubar Dumpers For Emptying Eighty Gallon Storage Cans



Problem: Feeding eighty gallon stainless steel cans of creams and pastes to tub-filling machines on the floor below.

Solution: A battery of Tubar Dumpers elevate the cans and feed the creams and pastes into funnels and supply pipes with production line efficiency.

Use Tubar Dumpers to solve your handling problems . . . cut operating and labor costs . . . speed up production. We custom build Tubar Dumpers to fit your exact job needs. Our representatives are available to give you complete information. Write today!

Tubar
ASSURES QUALITY
UHRDEN, INC. • DENNISON, OHIO
LIFTS • DUMPERS • CRANES

 For more facts Circle 558 on Reader Service Card

MR. INDUSTRIALIST

A NEW PLANT SITE
In the HEART of INDUSTRIAL AMERICA
GREENVILLE, PENNSYLVANIA

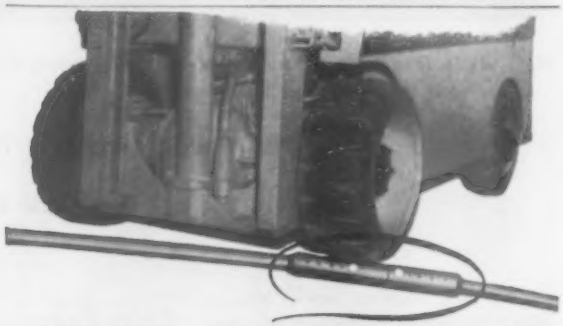
DO YOU REQUIRE	YES	NO
Location MIDWAY between PITTSBURGH, CLEVELAND and ERIE	☐	☐
Served by FOUR MAJOR RAILROADS	☐	☐
Unlimited ELECTRIC POWER and NATURAL GAS SUPPLY	☐	☐
Municipal-type WATER SERVICE, SEWAGE DISPOSAL FACILITIES	☐	☐
IDEAL HOME SITES	☐	☐
Modern SCHOOLS and Liberal Arts COLLEGE	☐	☐
Excellent RECREATIONAL OPPORTUNITIES	☐	☐
DO YOU REQUIRE		
★ ★ FOR LEASE Industrial type building — Rail Siding Sprinklered — 30,720 Sq. Ft. — 13' 2" Clearance	☐	☐
★ ★ ★ FOR SALE or LEASE Industrial type building — Rail Siding Sprinklered — 25,000 Sq. Ft. — 14' Clearance	☐	☐

All YES Score indicates you should write for FREE booklet and further information to:

REYNOLDS DEVELOPMENT

ROBERT B. PARKER, JR., Managing Engineer
P.O. Box 606 Greenville, Pa.

For more facts Circle 559 on Reader Service Card



ROLL OVER 'EM . . . WALK ON 'EM

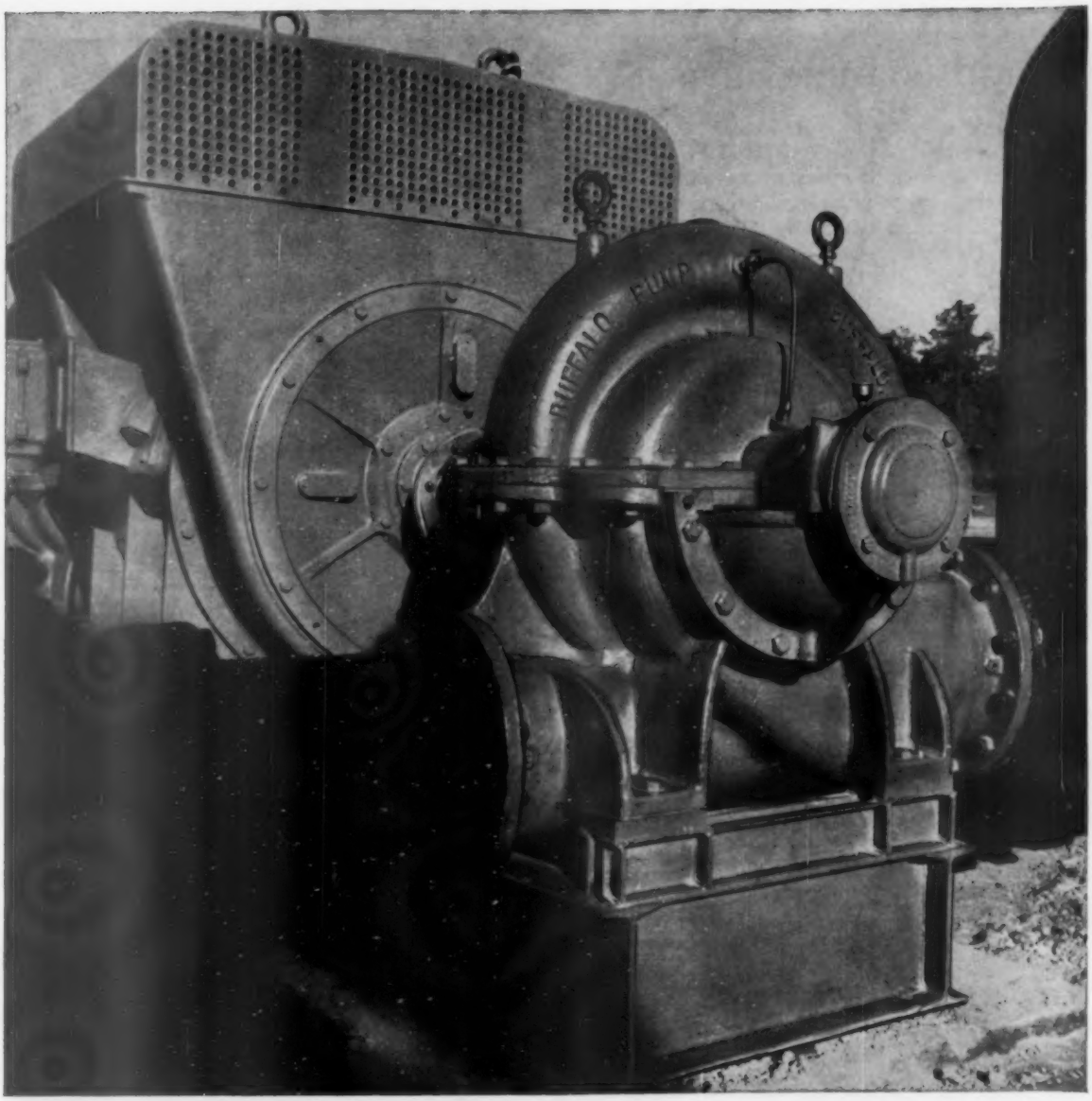
You Can't Damage Rugged, Durable JOY EQUIPMENT CONTROL CONNECTORS

- **Crush Proof!** Complete assembly safely, durably embedded in resilient Neoprene. As distortion, impact and shock proof as a rubber ball!
- **Dust, Water and Corrosion Proof!** Special tight-fit design positively excludes industrial dirt, moisture, corrosive acids.
- **Molded to Cable!** Flex, bend or twist! Integral cable-and-connector can take roughest treatment without breakdown.
- **Wide Selection of Sizes!** From 2 to 12 poles, in all standard cable lengths. Immediate delivery.

Write for Free Illustrated CATALOG B-72 CD 200.2

JOY ELECTRICAL PRODUCTS DIVISION
1245 Mecklind, St. Louis 10, Mo.
Exec. Offices: Henry W. Oliver Bldg., Pittsburgh 22, Pa.

For more facts Circle 560 on Reader Service Card



1 of 3 'Buffalo' Pumps delivering a total of 13 to 15 MGD to a major paper mill day after day.

Big pumps, small pumps, in most materials, every job, every industry—our Buffalo Pumps Division has excelled in this for over 83 years. Write direct or call in a Buffalo representative.

"Buffalo" PUMPS

BUFFALO PUMPS DIVISION

Buffalo Forge Company • Buffalo, New York

Buffalo air handling equipment to move, heat, cool, dehumidify and clean air and other gases.

Buffalo Machine Tools to drill, punch, shear, bend, slit, notch and cope for production or plant maintenance.

Buffalo Centrifugal Pumps to handle most liquids and slurries under a variety of conditions.

Sugar machinery to process sugar cane, coffee and rice. Special processing machinery for chemicals.

For more facts Circle 561 on Reader Service Card

Maintenance Ideas

They'll save dollars for you—dollars that will add up fast. And where can you find these ideas? In FACTORY reprints, of course. The list below tells you the titles we carry in stock. To get the ones you want, order (by code number and title) from FACTORY Reader Service, 330 W. 42nd St., New York 36. Send cash or check. Or ask us to bill you. Now scan the list below.

35 CENTS EACH

A15 18 Ways to Cut Maintenance Costs
A119 Making Your Dials Read Right
A127 Plant Site Selection Guide
A128 Getting Answers to Maintenance Training Questions
A129 Slicing Maintenance Labor Costs
A131 Better Way to Rate and Pay Maintenance Workers
A139 What Planned Maintenance Means to Me
A148 18 Checks on Maintenance Costs
A158 16 Soft Spots in Maintenance Costs
A159 How to Make a Maintenance Audit
A173 How to Audit Obsolescence
A177 How to Divvy Up New-Plant Money
A179 What You Will Pay for What You Want in Your New Plant
A183 Maintenance Plan to Fit Any Plant
A201 A Pro Looks at Maintenance Cost Reduction
A224 2 New Ways to Measure Maintenance Efficiency

50 CENTS EACH

A20 Measure Maintenance Performance
A21 Mechanized Maintenance Control
A22 The Management of Maintenance
A24 Keep Your Plant Up—Costs Down
A25 How to Build a Maintenance Program Now
A26 Maintenance Control That Really Controls
A27 How to Boost the Maintenance Department's Productivity
A28 What Should Maintenance Cost?
A29 How to Find & Control Your Maintenance Costs
A31 Best in Plant Maintenance
A33 Select the Right Floors
A34 Install Floors for Long Life
A35 Make Floors Last Longer
A106 Preventive Maintenance
A180 Better Maintenance Stores (3 articles)
A187 What Industry Is Spending for Maintenance
A193 159 Ways to Build Low-Cost Maintenance into Your Plant
A208 Maintenance by Contract
A211 How To Organize for Better Maintenance

PLANT SERVICES

35 CENTS EACH

A161 Those Hidden Handling Costs
A166 How to Save Real Money on Power
A169 Let Lights Burn — or Turn 'em Off?
A171 The Whole Story on Water Costs
A178 Puzzled About Buying Motors?
A200 Hitting the High Cost of Handling
A202 16 Signs of Power Trouble
A205 Getting Your Best Plant Layout
A230 3 New Tools for Better Plant Layout
A231 Scrap Recovery

50 CENTS EACH

A43 Adopt the Best in Plant Layout
A134 Static Electricity — $100-Million Headache
A162 Electrical Management & Maintenance Practices Today (Survey of 329 plants)
A221 Spot Heating

SEARCHLIGHT SECTION
(Classified Advertising)
EMPLOYMENT • BUSINESS
EQUIPMENT — USED OR RESALE
OPPORTUNITIES

DISPLAYED RATE

EQUIPMENT & BUSINESS OPPORTUNITY advertising $27.50 per inch.

EMPLOYMENT OPPORTUNITIES—$37.40 per inch, subject to Agency Commission.

An Advertising inch is measured ⅞" vertically on one column, 3 columns—30 inches—to a page.

UNDISPLAYED RATE

(Not available for equipment advertising)
$2.40 a line, minimum 3 lines.

POSITIONS WANTED undisplayed rate is one-half of above rate, payable in advance.

Box Numbers—Count as one line.

Discount of 10% if full payment is made in advance for 4 consecutive insertions.

SR. DESIGN ENGINEER
$10,000 - $12,000
Outstanding appliance firm need Sr. Design Engineer in related fields such as steam and dry irons, cooking appliances, small motor and other appliances. Direct board work under very desirable surroundings. Firm leaders in field. Excellent opportunity. Fee paid.
MONARCH PERSONNEL
28 East Jackson Blvd., Chicago 4, Illinois

ADDRESS BOX NO. REPLIES TO: Box No.
Classified Adv. Div. of this publication.
Send to office nearest you:
NEW YORK 36: P. O. BOX 12
CHICAGO 11: 520 N. Michigan Ave.
SAN FRANCISCO 4: 68 Post St.

POSITION WANTED

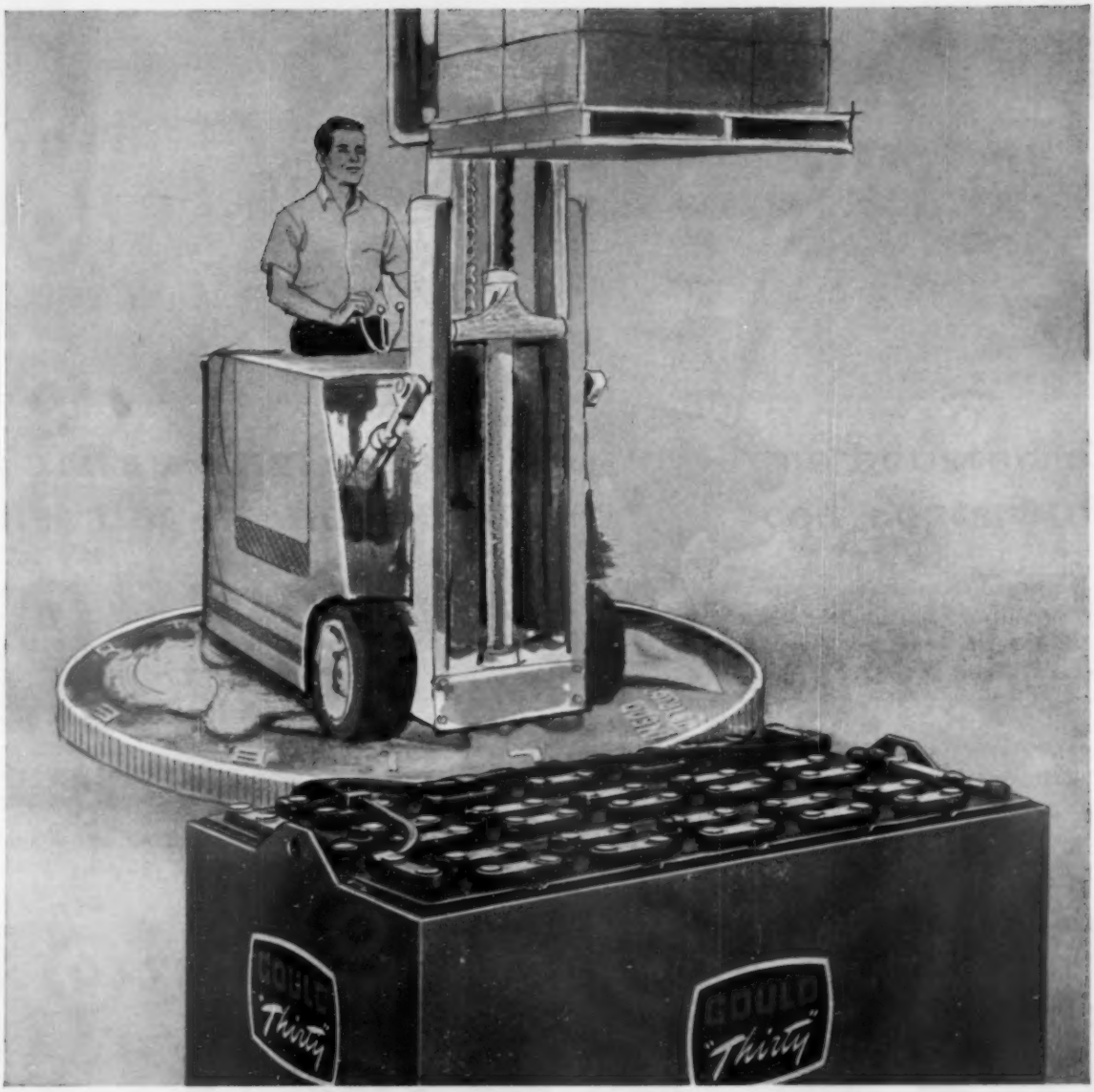
Profit Engineer, 31 yr. old, I. E. seeks position stressing personal growth, challenge and individualism. 7 yrs. diversified background in work measurement techniques, budget application and supervision. PW-4660, Factory.

SPECIAL SERVICE

Time Study Boards with transparent watch holders, stop watches, Pedometers. Slide Rules. Forms in stock. Sample Kit Free. Oznam Products Co., 5544 S. Homan Ave., Chicago 29.

INDUSTRIAL ENGINEERS
$8,000 - $12,000
Company hiring several Industrial Engineers to aid in their aggressive expansion plan with wide range of salaries. Fine highly rated company located in modern facilities. Company pays all fees.
MONARCH PERSONNEL
28 East Jackson Blvd., Chicago 4, Illinois

RELAYING • NEW RAILS
TRACK MATERIALS
MIDWEST STEEL CORP.
610 DRYDEN STREET
CHARLESTON 21, W. VA.



Electric Trucks are MORE MANEUVERABLE

Short-wheelbase electric trucks require less turning radius. They are capable of handling loads in much narrower aisles and congested areas. These battery-powered electric trucks make possible an increase in space utilization by reduction in aisle width.

Add maneuverability to a convincing list of other benefits—lower operating costs, less maintenance, clean, quiet and safe operation—and you can see the reason why users prefer battery-powered electric trucks for modern, efficient materials handling.

Electric truck users generally agree on one other point, too—Gould Batteries for longer life. With the new Silconic Plate, Gould Batteries offer up to 25% longer life.

Join the list of users who prefer this ideal combination of electric trucks and Gould Batteries. For more information, write or call your local Gould representative. Ask for booklet "Why We Use Battery-Electric Industrial Trucks." Gould-National Batteries, Inc., Trenton 7, N. J. In Canada, write to Gould-National Batteries of Canada, Ltd., 1819 Yonge Street, Toronto, Ontario.

More Power to you from **GOULD**

For more facts Circle 562 on Reader Service Card

WHICH JOB WOULD YOU TAKE?

If you're like most of us, you'd take the job with the more tempting salary and the brighter future.

Many college teachers are faced with this kind of decision year after year. In fact, many of them are virtually bombarded with tempting offers from business and industry. And each year many of them, dedicated but discouraged, leave the campus for jobs that pay fair, competitive salaries.

Can you blame them?

These men are not opportunists. Most of them would do anything in their power to continue to teach. But with families to feed and clothe and educate, they just can't make a go of it. They are virtually *forced* into better paying fields.

In the face of this growing teacher shortage, college applications are expected to *double* within ten years.

At the rate we are going, we will soon have a very real crisis on our hands.

We *must* reverse this disastrous trend. You can help. Support the college of your choice today. Help it to expand its facilities and to pay teachers the salaries they deserve. Our whole future as a nation may depend on it.

It's important for you to know more about what the impending college crisis means to you. Write for a free booklet to: HIGHER EDUCATION, Box 36, Times Square Station, New York 36, N.Y.

ADVERTISING COUNCIL PUBLIC SERVICE

Sponsored as a public service, in co-operation with the Council for Financial Aid to Education

HIGHER EDUCATION
KEEP IT BRIGHT

"Puritan Engineered Maintenance boosted our cleaning standards 30%—reduced costs 20%!"

"We produce a line of highly sensitive electromechanical meter-relays, panel meters, and complete controls," says Mr. John Saint-Amour, President of Assembly Products, Inc., Chesterland, Ohio. "To maintain proper control over quality, our production and assembly areas must be as clean and as free of dust as possible. As a result, we have always placed unusual stress on maintaining good housekeeping and sanitation 'practices'."

"This is why we immediately recognized the advantages offered by Puritan Engineered Maintenance. It allowed us to put plant housekeeping on a scientific basis; spelled out how, when and where to do the job; gave direction to our cleaning operations; provided standards and instruction for our custodians; and it set up regular inspection procedures to keep our standards up to par."

"But the end results of Puritan Engineered Maintenance were even more gratifying. We've raised our existing levels of housekeeping one-third—have seen a startling increase in the efficiency of our custodial staff—and best of all, have accomplished all this at 20% less cost!"

Survey. In setting up Assembly Products' program, Puritan first made a detailed survey of the premises—pinpointed jobs to be done.

Program. A custom designed Engineered Maintenance Program was prepared. Details were explained to management and supervisors.

Training. Individual custodial responsibilities were explained. Training in scientific cleaning techniques was undertaken.

Inspection. Regular inspections spot trouble areas and uncover any other problems. Corrective measures can be undertaken immediately.

Whether your sanitation standards must be maintained at peak levels—or whether your operations simply call for normal, efficient housekeeping—chances are, you'll benefit from Puritan Engineered Maintenance. This unique service is available, without charge, to users of Puritan sanitary maintenance supplies. Why not get details today?

PURITAN CHEMICAL COMPANY

EXECUTIVE OFFICES: 916 ASHBY STREET, N. W. ATLANTA 18, GEORGIA

PLANTS AND WAREHOUSES: ATLANTA, GA. • HOUSTON, TEX. • ST. LOUIS, MO.

For more facts Circle 563 on Reader Service Card

PURITAN CHEMICAL COMPANY

916 Ashby Street, N.W. • Atlanta 18, Georgia

Send me a free copy of your 16-page booklet, ENGINEERED MAINTENANCE.

NAME _____ TITLE _____

COMPANY _____

ADDRESS _____ CITY _____ STATE _____

Industrial Engineers

Collins Radio Company, Cedar Rapids Division, has several excellent openings for EE's, ME's or IE's who are interested in working in the field of electronics manufacturing. These positions offer good starting salaries plus opportunity for rapid advancement with an expanding firm.

Collins is one of the leaders in electronics, and enjoys the reputation of producing top quality equipment in aviation communication and navigation, amateur radio, broadcast, and ground communication fields.

For more information, please send your resume in complete confidence to: Mr. L. R. Nuss, Manager of Professional Employment, Collins Radio Company, Cedar Rapids, Iowa.

COLLINS

COLLINS RADIO COMPANY, CEDAR RAPIDS · DALLAS · BURBANK

IF YOU CHANGE YOUR ADDRESS

please be sure to let us know promptly. It takes time to correct the stencil addressing plate. And we don't want you to miss copies of FACTORY.

EASY, quick way to tell us . . . use the Reader Service Card opposite the back cover. Be sure to give us both your *old* address and your *new* address, including your postal zone number. Drop the card in the mail and we'll make the change as quickly as possible.

FACTORY

330 West 42nd Street, New York 36, N. Y.

The biggest step in business ...the short distance from the middle to the top

Companies are still canvassing colleges like crazy for bright young engineers and technologists . . .

But what about the man with ten or more years invested in his company? Here he is, ready to take on heavier responsibility. How much longer must he wait?

Upstairs in his company, management will tell you their biggest job is finding new top talent. And what they are seeking most in a man is something more than just his proficiency in his post.

They're seeking an alertness to all phases of the business . . . long range planning, policy-making, new product development and research . . . breadth as well as depth.

The men who edit this particular McGraw-Hill publication for you, recognized this responsibility long ago. They answer it in these pages. Here, is the perspective you need to push ahead. And as you read, keep reaching, for . . .

Men who read more...earn more!

You never paint V-Corr roofing and siding

...YOU WASH IT WITH RAIN!

V-Corr is the only heavy-duty corrugated steel protected with a ceramic skin. It gives you almost endless years of service—and it's maintenance-free.

The colored coating is fused into the metal at temperatures over 1500°F. As a result, steel and coating become a single mass.

You never have to paint V-Corr –
weather won't wear it; colors are permanent.

You never have to rustproof V-Corr –
corrosion can't attack it.

You never have to fireproof V-Corr –
it's rated non-combustible.

You need no special tools for V-Corr –
you can cut it, drill it, stack-drill it.

If "special problem areas" have been running up your costs for roofing and siding, V-Corr is your ticket. It's unaffected by salt air, moisture, steam. It's resistant to industrial fumes, gases, most corrosive chemicals.

Look into it. It's a money-saver.

V-Corr Ceramic-Coated Roofing and Siding is an exclusive product of

THE BETTINGER CORPORATION
Milford, Massachusetts • Toledo, Ohio

IN CANADA:
Cerametal Industries, Streetsville, Ontario

THE BETTINGER INTERNATIONAL FAMILY OF LICENSE ASSOCIATES:

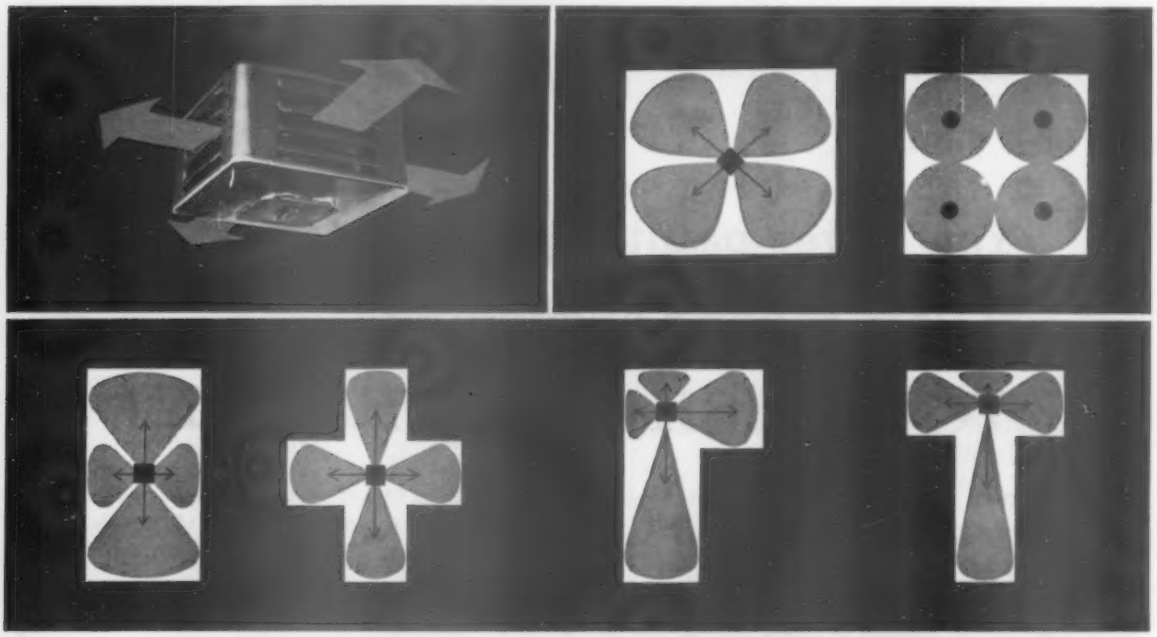
Mannesmann, A. G., Dusseldorf, Germany
Emailleries Crahait, Gosselies, Belgium
Inter-Island Gas Service, Inc., Manila, Philippine Islands
Vitreous Enamelling Corp. (Pty) Ltd., Cape Town, South Africa
Emailleries & Toleries Reunies, S.A., Auxi-le-Chateau, France
Smalterie Lombarde, Milan, Italy
Kockums Emaljerverk, Ronneby, Sweden

V-Corr Bulletin 30 brings you specifications, engineering data, and erection procedures. Write us for a copy

EVER TAKE A GOOD LOOK AT THE CARRIER 4-WAY UNIT HEATER?

Look! Its "Clover Leaf" pattern can discharge heated air in as many as four directions at once. One Carrier 4-way heater does the job of two or more vertical discharge heaters—or four to six horizontal heaters.

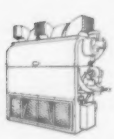
Look! Using all four of its outlets, the largest of these Carrier 4-way units can heat a room over 100 feet square. It takes several vertical discharge heaters to do this same job.



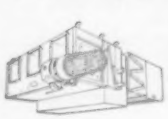
Look! Adjustable louvers make it easy to vary the shape of the "Clover Leaf" air distribution pattern. Without changing outlets or adding accessories, it can heat L, T, I or square-shaped rooms or buildings.

If you're building a new plant or modernizing an existing one, Carrier "Clover Leaf" Unit Heaters can save you money three ways—lower installation, lower operating costs and lower maintenance costs. For steam or hot water, they're available in eight sizes ranging from 55,000 to 600,000 Btu/hr. For information, call your Carrier representative listed in your Classified Telephone Directory under "Heaters—Unit." Or write Carrier Corporation, Unit Heater Department, Syracuse 1, New York.

Carrier offers every type of equipment for any commercial or industrial job

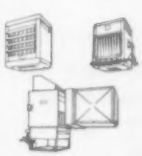


Heat Diffusers—Direct Fired for gas or oil



Heating and Ventilating Units for steam and hot water

Unit Heaters for steam and hot water



Gas Unit Heaters and Duct Furnaces

Carrier

AIR CONDITIONING
REFRIGERATION
HEATING
VENTILATING

For more facts Circle 565 on Reader Service Card

Index To Advertisements

Acme-Hamilton Mfg. Corp. 141
Acme Steel Company
Acme Steel Products Div. 131-134
Acme Industries, Inc. 213
Acme Visible Records, Inc. 231
Adams Co., Inc., R. P. 220
Aeroquip Corporation 222
Alden Systems Company 205
Allen-Bradley Company 51, 52
Allis-Chalmers 125, 127, 151
Aluminum Company of America 235
American Air Curtain Corporation
Subsidiary of Universal Match
Corp. 31
American District Telegraph Co. 9
American Monorail 189
American Sealants Company 58
American Sisalkraft Corporation 257
American-Standard, Industrial Div. 39-42
Apex Machine & Tool Co. 130
Aro Equipment Corporation 214
Atlas Copco 247
Automatic Transportation Company 241

Barreled Sunlight Paint Co. 128
Bell & Gossett Company 219
Bellows Company, Valvair
Corporation 56
Bessemer & Lake Erie Railroad 256
Bettinger Corporation 275
Binks Manufacturing Company 118
Black & Decker Mfg. Co. 48, 49
Borroughs Manufacturing Co. 10
Bradley Washfountain Co. 248
Brown Company 234
Buffalo Pumps Division,
Buffalo Forge Company 269
Buffalo Meter Company, Inc. 223
Bulldog Electric Products Division,
I-T-E Circuit Breaker Co. 225
Burgess-Manning Company 266
Bussmann Mfg. Div.,
McGraw-Edison Co. 24, 25
Butler Manufacturing Co. 196

Carrier Corporation 21, 276
Century Electric Company 202
Chisholm-Moore Hoist Division,
Columbus McKinnon Chain
Corporation 140
Clarage Fan Company 180
Clark Equipment Company 171
Cleco, Div. of Reed Roller Bit Co. .. 204
Cleveland Tramrail Div., Cleveland
Crane & Engineering Co. 265
Collins Radio Company 274
Committee on Steel Pipe Research .. 172
Container Corporation of America .. 237
Corning Glass Works 43
Crane Company 11

Dempster Brothers 263
Detecto Scales, Inc. 244
DeVilbiss Company 14, 15
Douglas Fir Plywood Association 278
Dow Corning Corporation 216
duPont de Nemours & Co. (Inc.), E.I.
Finishes Division 53

Elliott Company 46, 47
Elwell-Parker Electric Co. 7
Eriez Mfg. Co. 116
Export Corporation 203

Factory 270
Fairbanks, Morse & Co. 29, 143
Falk Corporation 197
Federal-Mogul Service, Div. of
Federal-Mogul-Bower Bearings,
Inc. 201
Felters Company 238
Fenwal, Incorporated 187
Finnell System, Inc. 183
Foster Company, L. B. 185

Galv-Weld Products 264
Gardner-Denver Company 111
General Electric Company
Apparatus Div. 120, 121, 227-230
Lamp Dept. 173
Goder Incinerators, Joseph 239
Globe Company 194
Goodrich Company, B. F. 1
Goodyear Tire & Rubber
Company, Inc. 5
Gould-National Batteries, Inc. 271
Graphic Systems 258
Grinnell Company ..... Second Cover
Gulf Oil Corporation 190, 191

Hagan Chemicals & Controls, Inc. .. 126
Harnischfeger Corporation 113, 114
Heppenstall Company 266
Hough Co., Frank G. 149

Industrial Sanitation Counselors 205
Ingersoll Rand 245
International Business Machines 174, 175
Invincible Vacuum Cleaner Mfg. Co. 150
I-T-E Circuit Breaker Company 38

Janitrol Heating & Air Conditioning,
Div. of Midland-Ross
Corporation 209, 210
Johns-Manville 50
Johnson Service Company 199
Joy, Electrical Products Division 268

Keasbey & Mattison Company 154
Kentucky Department of
Economic Development 30
Kidde & Company, Inc., Walter 264
Kinnear Manufacturing Co. 8
Koppers Company Inc.,
Tar Products Div. 217

Lincoln Electric Company 32, 33
Link-Belt Company 117, 184
Lion Oil Company 45
Lyon Metal Products, Inc. 215

Mahon Company, R. C. 259
Markem Machine Co. 44
Master Builders Company 59
Master Power Corporation 109
Mathews Conveyer Company.. 186
McGraw-Hill Book Company .. 254, 258
Micro Switch Division, Minneapolis-
Honeywell Regulator Co. 192
Minerals & Chemicals Corporation of
America, Speedi-Dri Division 203
Minneapolis-Honeywell
Regulator Co. 267
Minnesota Mining &
Manufacturing Co. 12, 13, 249
Motorola Communications &
Electronics, Inc. 145

National Vulcanized Fibre Co. 112
Northern Natural Gas Company 231

Otis Elevator Company 34, 35
Owatonna Tool Company 260

Pannier Corporation 246
Petersen Manufacturing Company .. 220
Philco, Government &
Industrial Group 200
Pittsburgh Plate Glass Co. 255
Porter Company, Inc., H. K.,
Connors Steel Division 142
Prime-Mover Company 65
Puritan Chemical Company 273

Republic Steel Corporation 36, 37
Revolvator Company 146
Reynolds Development 268
Reynolds Metals Company 57
Richards-Wilcox Manufacturing Co. 115
Ridge Tool Company 212
Robot Industries, Inc. 264
Rol-a-chart 244
Rotary Lift Company 6
Rotor Tool Company 178, 179
Royal McBee Corporation 250
Ryerson & Son, Inc., Joseph T. 60

Shepard Niles Crane & Hoist Corp. 208
Sherwin-Williams Co. 144
Shuford Mills, Inc. 188
SKF Industries, Inc. 66
Skil Corporation 28
Sly Manufacturing Co., W. W. 226
Smith Corporation, A. O. 248
Snap-On Tools Corporation 211
Spencer Turbine Company 124
Square D Company 147, 181,
Third Cover
Standard Instrument Corporation 239
Standard Screw Company 262
Standard Pressed Steel Company 195
Sterling Electric Motors, Inc. 16
Structoglas Div., International
Molded Plastics, Inc. 139
Sugar Beet Products Co. 240
Sylvania Electric Products, Inc. 153

Taylor Company, Halsey W. 243
Texaco, Inc. 17-20
Thiokol Chemical Corporation 242
Thor Power Tool Company 123
Timken Roller Bearing
Company ..... Fourth Cover
Toledo Pipe Threading Machine Co. 239
Torit Manufacturing Company 233
Towmotor Corporation 4
Tranter Manufacturing, Inc.,
Platecoil Div. 148

Uhrden, Inc. 268
Universal Metal Hose Company 205
U.S. Rubber Company 232, 253

Valdura Heavy-Duty Paint Division,
American-Marietta Company 152
Valvoline Oil Company 193
Veeder-Root Electronic
Controls Division 129

Westinghouse Electric
Corporation 54, 55, 261
Lamp Division 26, 27
Whitney Chain Company 122
Wilbur & Williams Company, Inc... 224
Wilkerson Corporation 218
Wire & Iron Products, Inc. 266
Worthington Corporation .. 22, 23, 119
Wright Hoist Division, American
Chain & Cable Co., Inc. 221

■

Industrial Consultants 264

■

SEARCHLIGHT SECTION
(Classifed Advertising)
F. J. Eberle, Business Mgr.

■

Employment Opportunities 270
Special Services 270
EQUIPMENT
(Used or Surplus New) For Sale .. 270

A REPORT TO MANAGEMENT ON HOW

Industry cuts costs with FIR PLYWOOD

ROUTE TO:

- ☐ ENGINEERING
- ☐ PRODUCTION
- ☐ SALES
- ☐ PURCHASING
- ☐ MAINTENANCE
- ☐ CONSTRUCTION
- ☐ _____

Fir plywood vault components were the key to low cost and high strength of this loading dock roof at Foremost Dairies, Seattle. Construction went fast because of the light weight and large size of prefabricated roof parts. In-place cost of the 260-ft., 12-bay roof was less than thin-shell concrete or a conventionally framed flat roof with the same span. Components were 4x13-ft. arched stressed skin plywood panels. Besides economy, the plywood vaulted roof system offers strength, rigidity and many design variations.

Overlaid plywood acid tanks at St. Louis Lithographing Co. cost less than lead or stainless steel, weigh less, and are easier to build and maintain. Resin-fiber overlay, permanently fused to waterproof plywood, is smooth, hard and highly acid-resistant.

Plywood tote trays reduced chances of damage in transit for IBM shipments of precision parts to the Rochester, Minn. plant. Plywood's large panel size and workability made it possible to design, quickly and economically, several tray types to give maximum protection to various sizes of parts. Plywood is strong and rigid, yet light-weight and low-cost to ship.

FOR MORE INFORMATION about fir plywood—its uses, properties and advantages—write

DOUGLAS FIR PLYWOOD ASSOCIATION

TACOMA 2, WASHINGTON

—an industry-wide organization devoted to research, promotion and quality control

Always specify by DFPA grade-trademarks

DFPA TESTED QUALITY

For more facts Circle 566 on Reader Service Card

Want more information?

The editors of FACTORY provide this Reader Service Card as just that . . . a means by which you, the reader, can be serviced further. By using either of the two postcards below, which don't even require stamps, you can obtain more information on items mentioned in this issue's EQUIPMENT NEWS . . . MATERIALS NEWS . . . and IDEAS OF THE MONTH. You can get the catalogs described in the CATALOG NEWS and ADVERTISERS' LITERATURE columns. You can ask manufacturers for more data on ADVERTISED ITEMS.

TO SUBSCRIBE
Use handy order card in center of magazine

Don't forget to write your name and address—First thing to do is fill in your name, title, and address information on *either* postcard on this page. Circle key numbers — again on either postcard—corresponding to those on items in Catalog News, Equipment News, Materials News, Ideas of the Month, and Advertisers' Literature; and on advertisements of products or services on which you want more facts. Then mail; no postage necessary.

To correct your FACTORY mailing address—Just put your name and *new address* on the lines provided on either postcard at right. Then write *clearly* across the postcard: ADDRESS CHANGE. *Please add your old address.* Then just drop in the mailbox. We'll make the change as quickly as possible, so you won't have to wait for your issue of FACTORY.

CATALOGS — 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26
27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56
57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 78 79 80 81 82 83 84 85 86 87

EQUIPMENT — 88 89 90 91 92 93 94 95 96 97 98 99 100 101 102 103 104 105 106
107 108 109 110 111 112 113 114 115 116 117 118 119 120 121 122 123 124 125 126 127 128
129 130 131 132 133 134 135 136 137 138 139 140 141 142 143 144 145 146 147 148 149 150
151 152 153 154 155 156 157 158 159 160 161 162 163 164 165 166 167 168 169 170 171 172
173 174 175 176 177 178 179 180 181 182 183 184 185 186 187 188 189 190 191 192 193 194

MATERIALS — 195 196 197 198 199 200 201 202 203 204 205 206 207 208 209 210 211 212 213
214 215 216 217 218 219 220 221 222 223 224 225 226 227 228 229 230 231 232 233 234 235

IDEAS OF THE MONTH — 236 237 238 239 240 241 242 243 244 245 246 247 248 249 250 251 252
253 254 255 256 257 258 259 260 261 262 263 264 265 266 267 268 269 270 271 272 273 274

ADVERTISERS' LITERATURE — 275 276 277 278 279 280 281 282 283 284 285 286 287 288 289 290
291 292 293 294 295 296 297 298 299 300 301 302 303 304 305 306 307 308 309 310 311 312
313 314 315 316 317 318 319 320 321 322 323 324 325 326 327 328 329 330 331 332 333 334
335 336 337 338 339 340 341 342 343 344 345 346 347 348 349 350 351 352 353 354 355 356
357 358 359 360 361 362 363 364 365 366 367 368 369 370 371 372 373 374 375 376 377 378

ADVERTISEMENTS — 382 383 384 385 386 387 388 389 390 391 392 393 394 395 396 397 398 399
400 401 402 403 404 405 406 407 408 409 410 411 412 413 414 415 416 417 418 419 420 421
422 423 424 425 426 427 428 429 430 431 432 433 434 435 436 437 438 439 440 441 442 443
444 445 446 447 448 449 450 451 452 453 454 455 456 457 458 459 460 461 462 463 464 465
466 467 468 469 470 471 472 473 474 475 476 477 478 479 480 481 482 483 484 485 486 487
488 489 490 491 492 493 494 495 496 497 498 499 500 501 502 503 504 505 506 507 508 509
510 511 512 513 514 515 516 517 518 519 520 521 522 523 524 525 526 527 528 529 530 531
532 533 534 535 536 537 538 539 540 541 542 543 544 545 546 547 548 549 550 551 552 553
554 555 556 557 558 559 560 561 562 563 564 565 566 567 568 569 570 571 572 573 574 575
576 577 578 579 580 581 582 583 584 585 586 587 588 589 590 591 592 593 594 595 596 597
598 599 600 601 602 603 604 605 606 607 608 609 610 611 612 613 614 615 616 617 618 619
620 621 622 623 624 625 626 627 628 629 630 631 632 633 634 635 636 637 638 639 640 641
642 643 644 645 646 647 648 649 650 651 652 653 654 655 656 657 658 659 660 661 662 77

NAME..... TITLE.....

Card Good Only Through October 1960

COMPANY..... July 1960-2

CITY AND STATE

STREET.....

CATALOGS — 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26
27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56
57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 78 79 80 81 82 83 84 85 86 87

EQUIPMENT — 88 89 90 91 92 93 94 95 96 97 98 99 100 101 102 103 104 105 106
107 108 109 110 111 112 113 114 115 116 117 118 119 120 121 122 123 124 125 126 127 128
129 130 131 132 133 134 135 136 137 138 139 140 141 142 143 144 145 146 147 148 149 150
151 152 153 154 155 156 157 158 159 160 161 162 163 164 165 166 167 168 169 170 171 172
173 174 175 176 177 178 179 180 181 182 183 184 185 186 187 188 189 190 191 192 193 194

MATERIALS — 195 196 197 198 199 200 201 202 203 204 205 206 207 208 209 210 211 212 213
214 215 216 217 218 219 220 221 222 223 224 225 226 227 228 229 230 231 232 233 234 235

IDEAS OF THE MONTH — 236 237 238 239 240 241 242 243 244 245 246 247 248 249 250 251 252
253 254 255 256 257 258 259 260 261 262 263 264 265 266 267 268 269 270 271 272 273 274

ADVERTISERS' LITERATURE — 275 276 277 278 279 280 281 282 283 284 285 286 287 288 289 290
291 292 293 294 295 296 297 298 299 300 301 302 303 304 305 306 307 308 309 310 311 312
313 314 315 316 317 318 319 320 321 322 323 324 325 326 327 328 329 330 331 332 333 334
335 336 337 338 339 340 341 342 343 344 345 346 347 348 349 350 351 352 353 354 355 356
357 358 359 360 361 362 363 364 365 366 367 368 369 370 371 372 373 374 375 376 377 378

ADVERTISEMENTS — 382 383 384 385 386 387 388 389 390 391 392 393 394 395 396 397 398 399
400 401 402 403 404 405 406 407 408 409 410 411 412 413 414 415 416 417 418 419 420 421
422 423 424 425 426 427 428 429 430 431 432 433 434 435 436 437 438 439 440 441 442 443
444 445 446 447 448 449 450 451 452 453 454 455 456 457 458 459 460 461 462 463 464 465
466 467 468 469 470 471 472 473 474 475 476 477 478 479 480 481 482 483 484 485 486 487
488 489 490 491 492 493 494 495 496 497 498 499 500 501 502 503 504 505 506 507 508 509
510 511 512 513 514 515 516 517 518 519 520 521 522 523 524 525 526 527 528 529 530 531
532 533 534 535 536 537 538 539 540 541 542 543 544 545 546 547 548 549 550 551 552 553
554 555 556 557 558 559 560 561 562 563 564 565 566 567 568 569 570 571 572 573 574 575
576 577 578 579 580 581 582 583 584 585 586 587 588 589 590 591 592 593 594 595 596 597
598 599 600 601 602 603 604 605 606 607 608 609 610 611 612 613 614 615 616 617 618 619
620 621 622 623 624 625 626 627 628 629 630 631 632 633 634 635 636 637 638 639 640 641
642 643 644 645 646 647 648 649 650 651 652 653 654 655 656 657 658 659 660 661 662 77

NAME..... TITLE.....

Card Good Only Through October 1960

COMPANY..... July 1960-1

CITY AND STATE

STREET.....

Your Finest Helps From FACTORY

You'll find them in reprints of FACTORY articles. In the short list below you'll see just a few (the very latest) of the 150 titles you can get. If you want to see a complete list, we'll send it to you. Meanwhile, pick the titles you want from the list below, mail your order to FACTORY Reader Service, 330 W. 42nd St., New York 36. Send cash—or ask us to bill you. Quantity prices on request.

50¢ PER COPY

Maintenance Management Practices Today (359-plant survey)
Electrical Management Practices Today (329-plant survey)
The Best in Plant Maintenance (8 timely FACTORY articles)
Organizing for Better Maintenance
Work Sampling Today

35¢ PER COPY

Getting Your Best Plant Layout
Think and Act Like a Manager
18 Ways to Pinch Pennies
Manners for Modern Managers

FIRST CLASS
PERMIT No. 22876
PHILADELPHIA, PA.

BUSINESS REPLY MAIL
No Postage Stamp Necessary if Mailed in the United States

POSTAGE WILL BE PAID BY
McGRAW-HILL PUBLISHING CO., INC.

FACTORY
c/o University of Pennsylvania
Computer Center
P. O. Box 7972
Philadelphia 4, Pa.

FIRST CLASS
PERMIT No. 22876
PHILADELPHIA, PA.

BUSINESS REPLY MAIL
No Postage Stamp Necessary if Mailed in the United States

POSTAGE WILL BE PAID BY
McGRAW-HILL PUBLISHING CO., INC.

FACTORY
c/o University of Pennsylvania
Computer Center
P. O. Box 7972
Philadelphia 4, Pa.

Catalogs in This Issue

To help you, here is a list of catalogs described in this issue. To obtain, circle key numbers on either postcard.

ELECTRICAL
1—Induction Motors
2—Motor Drives
3—Starters
4—Load-Center Unit Substations
5—Pick-Up Units
6—Induction Motors
7—Capacitors
8—Motors
9—Circuit Breaker Test Units

PIPES AND VALVES
10—Shut-Off Valves
11—Flow Tube
12—Solder Joint Valve
13—Tube Fittings
14—Valves
15—Rubber Hose

AUXILIARY
16—Moisture Control
17—Heavy-Duty Coils
18—Reactors
19—Gas Burners
20—Exhaust Purifiers
21—Fans
22—Steam/Water Controls
23—Sewage Treatment
24—Pumps

INSTRUMENTS AND CONTROLS
25—Telemeters
26—Balancing Machines
27—Control Systems
28—Temperature Controls
29—Testing Instruments

PRODUCTION
30—Milling Equipment
31—Carbon Arc Welding
32—Broaching Tools
33—Tools
34—Hardsurfacing
35—Welders, Rectifiers
36—Serva-Levl Mount
37—Collapsible Taps
38—Welding Equipment
39—Arc Welding

MAINTENANCE
40—Dust Collectors
41—Molded Packings
42—Markers, Signs
43—Vacuum Cleaning Systems

MATERIAL HANDLING
44—Lift Trucks
45—Fork Truck
46—Storage Equipment
47—Printweigh Scales
48—Power for Trucks
49—Coder
50—Wheel Conveyors
51—Portable Pneumatic Unloader
52—Dock Leveler
53—Lift Trucks
54—Rubber Bumpers

BUILDING
55—Partitions
56—Locks and Latches
57—Partitions
58—Timber Connectors

MECHANICAL
59—Fluid Drives
60—Speed Reducers
61—V-Belts
62—V-Belt Drives, Hose

NEW SMALL MAGNETIC STARTER COSTS LESS, SAVES SPACE ON LOW-HORSEPOWER JOBS!

CLASS 8536

Square D NEMA Size 00 Starter Rated ¾ to 2 Hp for 3-Phase Service

• You no longer need to buy more starter capacity than you can use for low-horsepower jobs! This new Square D Size 00 starter is compact, easy to install, simple to use and maintain—and it costs 18% less than the Size 0 starter you formerly had to specify to get the advantages of magnetic control! With no sacrifice in quality, this new starter provides: straight-through wiring—pressure-type terminals—1-piece overload relays for complete motor protection—pushbutton or selector switch optional in the cover. Also available without overload relays.

GET THE COMPLETE STORY! Write for Bulletin SM-297. Square D Company, 4041 North Richards St., Milwaukee 12, Wisconsin.

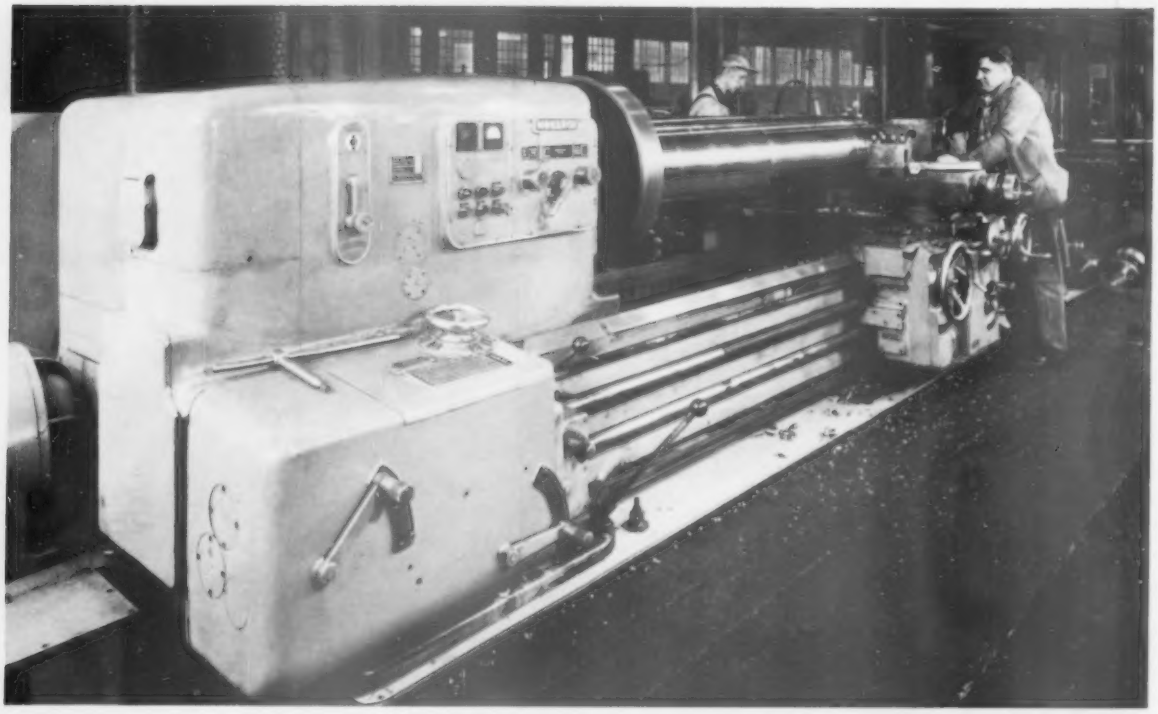
New starter is available either open or in NEMA Type 1 enclosure. Enclosure shown with selector switch in cover.

SQUARE D COMPANY

wherever electricity is distributed and controlled

For more facts circle 383 on READER SERVICE CARD

"Dyna-Shift" lathe ups output 25%, tool life 50%, —30 Timken® bearings maintain rigidity, accuracy



YOU merely set the controls of the Dyna-Shift drive on this Monarch Series 90 lathe to get the correct speed automatically. What's more, the "90" can be kept under full load at any speed, using modern tooling. Results, reports Monarch, show up to 25% more output and 50% greater tool life than with other equipment. Thirty Timken® tapered roller bearings at vital points—spindle, gear box, apron and tailstock—assure constant rigidity and accuracy, for maximum economy.

Most American machine tool builders use Timken bearings. Two big reasons are: 1) The taper lets Timken bearings take *both* radial and thrust loads or any combination. 2) Precision manufacture of Timken bearings assures high precision in the machine.

EXTRA ENGINEERING SERVICE. Often, our graduate engineer salesmen can solve your bearing problems on the spot, at the design stage, save you time and money.

THE FINEST GAGE LAB in the industry assures you top bearing accuracy. Some instruments we use measure even the thickness of a molecule, split a hair 30,000 times.

BETTER-NESS rolls on

TIMKEN®

tapered roller bearings

The Timken Roller Bearing Company, Canton 6, Ohio. Cable: "TIMROSCO". *Makers of Tapered Roller Bearings, Fine Alloy Steel and Removable Rock Bits.*

For more facts circle 384 on READER SERVICE CARD